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OF THE

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OF

LONDON

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Transactions, p. 89, middle. *Lycæna exilis* is described by Boisduval in Ann. Soc. Ent. Fr. 1852, p. 294.

p. 91, l. 6 from bottom. For *Lycæna notoba*, read *L. notobia.*

p. 160. The date of Stephens' description of *Raphidia maculicollis* is 1836, not 1846.

p. 192, l. 3 from bottom. The date of Wesmael's description of *Malacomyza lactea* in 1836, not 1840.

The rest of the citations of Wesmael, in Mr. McLachlan's Monograph of *Neuroptera-Planipennia*, should bear date 1841, not 1840.

p. 263, l. 13, read "labium sinuous in front, rounded in the middle, not ciliate,"

l. 23. Omit the word "hind."

l. 2 from bottom, read "labium sinuous in front, rounded in the middle, not ciliate."

p. 265, l. 17. For "decided," read "decidedly."

p. 297, l. 7 from bottom. For "applied to Curtis," read "applied by Curtis."

Proceedings, p. xi, l. 3 from bottom. For "*Nessiaro histria*," read "*Nessiara histrio.*"

p. xiv, l. 20, read "haustellum of the moth," omitting the word "*was.*"

p. xxxiv, l. 7, first column, read "Myrmidone (E)"

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THE

TRANSACTIONS

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ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1868.

I. *A Revision of the Australian* Buprestidæ *described by the* Rev. F. W. Hope. By Edward Saunders.

[Read 4th November, 1867.]

The large number of new species of Australian *Buprestidæ* contained in European collections have long required description; but the difficulty of this task has been seriously augmented by the confusion which has hitherto existed in the nomenclature of the already described species. The first work of any importance on the *Buprestidæ* of Australia was printed by Mr. Hope in 1836, in which are mentioned all the species then known to him from that part of the world. The descriptions, however, which he gives are so short, and wanting in specific character, as to be nearly useless; and, besides this, many of the insects he described as species can only be considered as mere varieties. Messrs. Laporte and Gory published their Monograph of the *Buprestidæ* shortly afterwards (1837-41), and although in their work they have corrected many of the errors made by Mr. Hope, they have fallen into several fresh ones, by describing and figuring under Mr. Hope's names species which do not at all agree with his types. Subsequently to this

work (1845-47), Mr. Hope published three papers in the fourth volume of the Transactions of this Society, containing many new species, but also several which are identical with those described by Messrs. Laporte and Gory, and some with those which he had himself previously described. Other papers have been published by various authors, in which are to be found several species identical with Mr. Hope's—thus making further additions to the already too complicated synonymy. It is with the hope of clearing up this confusion that the present paper has been undertaken; in it are given redescriptions and steel engravings of all Mr. Hope's species, the short Latin diagnoses used by that Author forming their headings. All his types, with the exception of three which are apparently lost, as well as those of Messrs. Gory, Thomson, Boheman, Chevrolat, White, and others, have been carefully examined, and the synonymy rendered as complete as practicable.

I have to express my best thanks to Prof. Westwood for the very kind manner in which he assisted me, while studying Mr. Hope's collection in the Oxford Museum. To recognize the original types was a work of considerable difficulty, and, but for the help of one well acquainted with Mr. Hope's writing, would have been almost impossible.

I would also express my thanks to Count Mniszech, Messrs. H. Deyrolle, Lucas, Thomson, Chevrolat, Boheman, and Stål, who have kindly assisted me by allowing me access to their collections, and have done their utmost to further the object I have had in view.

In the following revision, I have referred the species to the modern genera to which they respectively belong. *Diadoxus, Plagiope, Neocuris, Anilara, Prospheres, Merimna, Xyroscelis,* and *Paracephala,* will shortly be characterized by M. Henri Deyrolle.*

* At the time when this paper was prepared and read before the Society, I was under the impression that Mr. Hope's descriptions of 1836 had been published, and were entitled to priority over the names given by Laporte and Gory, and subsequent authors. But finding from the discussion which is reported in Proc. Ent. Soc., 1867, pp. cix, cx, that Mr. Hope's paper was printed only for private circulation, I have abandoned the names of the unpublished tract "Buprestidæ" in favour of published names, though later in point of date.—E.S. *March*, 1868.

Gen. CYRIA, Serville.

1. Cyria imperialis, (Pl. I. fig. 1, 2).

Buprestis imperialis, Fabr. Syst. Eleuth. ii. 204.
Cyria imperialis, (Hope, Bupr. p. 1).
Chrysochroa imperialis, L. & G. i. *Chrysoc.* 19, pl. v. fig. 20.
Buprestis australis, Boisd. Voy. Astrol. ii. 62, var.
Chrysochroa australis, L. & G. i. *Chrysoc.* 20, pl. v. fig. 21.
Cyria gagates, (Hope, Bupr. p. 1).

I feel quite convinced that these insects, which have hitherto been considered distinct, are to be referred to one and the same species; the British Museum possesses a series which exhibits every gradation between the black variety *australis* and the typical *imperialis*.

Hab. Australia.

2. Cyria vittigera, (Pl. I. fig. 3).

Cyria vittigera, (Hope, Bupr. p. 1).
Chrysochroa vittigera, L. & G. i. *Chrysoc.* 21, pl. v. fig. 22.

"Flava, elytris vittis nigris variegatis." (Hope).

Head black on the vertex, yellow above the mouth. Thorax black, with the anterior and lateral margins and dorsal line flavous. Elytra of the same colour as the thorax, with the lateral margins and a vitta on each, extending from the base almost to the apex, flavous. Underside black, covered with long white hairs.

Head punctured, channelled between the eyes, covered with long white hairs in front. Thorax half as broad again at the base as long; anterior margin three quarters the length of the base, elevated except just in its centre, which is slightly produced; sides nearly straight, posterior angles acute; base very slightly lobed. Elytra twice and a quarter as long as broad, punctate-striate; sides slightly curved, apex of each slightly emarginate. Underside and legs shining, punctured, clothed with long white hairs, with the exception of a space down the centre of the abdomen, which is almost denuded.

Length 13 lines; breadth 4 lines.

Hab. Australia.

Gen. DIADOXUS, (H. Deyr. MS.).

(Anthaxia, *pars*, Hope.)

1. Diadoxus erythrurus, (Pl. I. fig. 5).

Anthaxia pistacina, (Hope, Bupr. p. 10).

Stigmodera erythrura, White, in Stokes Voy. Austr. i. p. 507, pl. i. fig. 7.

"Capite antice luteo-viridi, inter oculos triangulo signato; thorace nigro-violaceo, vitta media marginibusque flavis; elytris acuminatis, nigricantibus, quatuor maculis flavis in singulo dispositis. Corpore subtus colore pistacino inquinato, tribus ultimis annulis abdominis rufo-brunneis flavisque maculis notatis." (Hope).

Head pistacinous in front, black on the vertex. Thorax with its dorsal line yellow, a vitta on each side of it black, and its sides pistacinous; there is also a small yellow spot near each posterior angle. Elytra black, each with four yellow discal spots, one at the base extending for about a third of the entire length of the elytra, and three others between it and the apex, the two upper ones of a transverse oval form, the one near the apex somewhat triangular; there is also a pistacinous vitta extending from the base along the lateral margin for about a third of its entire length. Underside and legs pistacinous, three apical segments of the abdomen chesnut-brown, each with four flavous spots, a small one on each side, and two large ones near the middle. Antennæ black.

Head punctured, covered with short hairs. Thorax half as broad again as long; anterior margin raised, slightly produced, three-quarters the length of the base; sides straight; base very slightly sinuate; disk very largely punctured, punctures closer on the sides; just above the scutellum is a small round pit. Elytra largely punctate-striate, twice and a third as long as wide; sides gradually converging to the apex, which is attenuate, and armed with a short spine on each elytron. Underside punctured, shining, with a few short white hairs.

Length 7 lines; breadth $2\frac{1}{4}$ lines.

Hab. Australia.

2. Diadoxus scalaris, (Pl. I. fig. 4).

Anthaxia Erichsoni, (Hope, Bupr. p. 10).

Buprestis scalaris, L. & G. i. *Bup.* 141, pl. xxxv. fig. 193.

"Affinis *A. pistacinæ*, at major. Antennæ nigræ, capite antice luteo-viridi, postice nigro triangulo signato; thorace tricolori punctato, lateribus pistacinis, vittis tribus flavis, binisque aliis nigris; elytris acuminatis, rubro-brunneis, maculisque variis flavis notatis. Corpore subtus pistacino, annulis abdominis utrinque flavo-maculatis et medio flavis et rubro-brunneis maculis inquinatis." (Hope).

Head greenish-yellow in front, black on the vertex. Thorax of the same colour as the front of the head, dorsal line yellow, with a black vitta on each side; there are also two yellow lines between these and the greenish sides. Elytra red-brown, each with five yellow spots, one of an oblong form starting from the base and extending not quite to the centre, between this and the apex are three others, the two upper irregular in shape, the apical one elongate; the lateral margin yellow from the shoulder to just above its middle. Underside and legs pistacinous; each segment of the abdomen with a small yellow spot on each side, and variegated with brown and yellow in the centre.

Head largely punctured. Thorax half as broad again as long; anterior margin slightly rounded, two-thirds the length of the base; sides slightly rounded behind the middle; base nearly straight; disk largely punctured. Elytra deeply punctate-striate, twice and a fifth as long as wide; sides scarcely sinuate above the middle; apex with a short spine. Underside and legs shining, finely punctured. Thorax, breast, and the sides of the abdomen, covered with a silky white pubescence.

Length 12 lines; breadth 3½ lines.

Hab. Australia.

Gen. CHRYSODEMA, Laporte and Gory.

1. Chrysodema gigas, (Pl. I. fig. 6).

Hope, Tr. Ent. Soc. iv. 208.

"Viridis; thorace fere quadrato, rugoso-punctato; elytris quadricostatis, marginibusque externis elevatis, tarsisque infra flavis." (Hope).

Upper-side green; underside with a slight coppery tint.

Head punctured rugosely, excavated between the eyes, the sides of the excavation raised. Thorax two-thirds as wide again as long; anterior margin produced in the

centre and at its angles, a little more than half as long as the base; sides rounded immediately behind the anterior angles, then nearly straight to the base, which has a very shallow median lobe; surface rugose, especially on the sides; disk with an irregular slightly raised dorsal line. Elytra a little more than twice as long as wide, finely punctured, each with four smooth elevated costæ; the lateral margins and suture also are rather raised; sides swelling out behind the middle; apex of each rounded, with a slight sutural angle. Underside and legs rugose, with a few short hairs.

Length 19 lines; breadth $6\frac{1}{2}$ lines.

Hab. Swan River.

Gen. CHALCOTÆNIA, H. Deyrolle.

(Buprestis, *pars*, and Evides, *pars*, Hope.)

1. Chalcotænia albivittis, (Pl. I. fig. 7).

Buprestis albivittis, Hope, Tr. Ent. Soc. iv. 214.

"Ænea, thorace punctulato, lateribus externis albis, elytrisque æneis, vitta albida laterali notatis." (Hope).

Head coppery. Thorax æneous, with a white impression extending along its lateral margin. Elytra concolorous with the thorax, each with a wide silvery pubescent vitta, extending from behind the shoulder to the apex. Underside and legs cyaneous, with coppery reflections.

Head very deeply punctured, and widely excavated between the eyes. Thorax half as broad again as long; anterior margin nearly straight, three-quarters the length of the base; sides very slightly curved; base straight; disk largely punctured, with a slightly raised dorsal line in front; each side with a long fovea, reaching from the margin to the base, these foveæ are very finely punctured, and slightly pubescent. Elytra twice and a quarter as long as wide, punctate-striate, each with an impressed pubescent lateral vitta; sides slightly sinuate above the middle, posterior margin denticulate, apex terminated in a short spine. Underside and legs punctured, with a few very short scattered hairs.

Length $12\frac{1}{2}$ lines; breadth 4 lines.

Hab. Van Diemen's Land.

Mr. Hope's type of this species has had a wrong head attached to it, I have therefore described that part from a specimen in the collection of Mr. Bakewell.

2. Chalcotænia Lamberti, (Pl. I. fig. 8).

Evides? Lambertii, (Hope, Bupr. p. 9).

Chrysodema Lamberti, L. & G. i. *Chrysod.* 14, pl. iv. fig. 18.

"Thorace cupreo-æneo punctato, medio sulcato; elytris marginatis serratis viridibus, quinque bronzeis lineis elevatis. Corpore infra viridi, segmentis abdominis utrinque farinoso-flavo-maculatis." (Hope).

Coppery-brown. Thorax with its dorsal line, and each elytron with four striæ, green. Underside and legs green, shining; each abdominal segment with a yellow pubescent spot on the side.

Head deeply punctured, largely excavated and channelled between the eyes. Thorax half as broad again as long; anterior margin three-quarters the length of the base, slightly produced in the centre and at its angles; sides slightly curved near the anterior angles, then almost straight to the base, which is very largely and deeply punctured with a strongly impressed dorsal line; each side with two deeply punctured foveæ, one of which is placed close to the posterior angle, the other just above it. Elytra punctured, wider than the thorax, twice and a fifth as long as wide, each with four deep wide striæ; sides gradually converging to the apex; posterior margins finely dentate. Underside and legs punctured, with a few scattered hairs, and two pubescent spots on each abdominal segment.

Length 13 lines; breadth 4 lines.

Hab. Australia.

Gen. CYPHOGASTRA, H. Deyrolle.

(Evides, *pars*, Hope.)

1. Cyphogastra farinosa, (Pl. I. fig. 9).

Buprestis farinosa, Fabr. Syst. Eleuth. ii. 195.

Evides farinosa, (Hope, Bupr. p. 9).

Chrysodema farinosa, L. & G. i. *Chrysod.* 21, pl. v. fig. 28.

Hab. North Australia.

Gen. PROSPHERES, (H. Deyr. MS.).

(Ancylocheira, *pars*, Hope.)

1. Prospheres aurantiopicta, (Pl. IV. fig. 6).

Ancylocheira? decostigma, (Hope, Bupr. p. 7).

Buprestis aurantiopicta, L. & G. i. *Bup.* 132 (*nec* fig.).

"Capite atro, thorace nigro-bronzeo punctulato, fossula

in medio fortiter impressa; elytris striatis, decem maculis aurantiis notatis. Corpore subtus nigro-æneo, pedibus rubris." (Hope).

Bronzy-black. Elytra with five small round golden spots on each, one touching the base, the second midway between the first and the middle of the elytron, two others at the middle side by side, (the sutural one a little the lower,) the fifth between these and the apex; on the lateral margin are three dull red spots, two near the shoulder almost touching each other, and one about a third of the length of the elytra from the apex. Underside and legs bronzy-green.

Head deeply punctured, somewhat depressed between the eyes, with a smooth raised dorsal line. Thorax not quite twice as broad as long; anterior margin raised, smooth, two-thirds the length of the base; sides slightly rounded; base bisinuate; disk largely punctured, the punctuation becoming denser on the sides, dorsal furrow deep, widening at the base, where it terminates in a round pit; near the posterior angle on each side is a deep, small, oblong fovea. Elytra deeply punctate-striate, especially at the sides, interstices also punctured; a little more than twice as long as wide; sides very slightly sinuate above the middle; apex truncate. Underside and legs punctured, covered with short white hairs.

Length $8\frac{1}{2}$ lines; breadth 3 lines.

Hab. Australia.

Gen. NASCIO, Laporte and Gory.

(Agrilus, *pars*, and Stigmodera, *pars*, Hope.)

1. Nascio xanthura, (Pl. I. fig. 10).

Agrilus xanthurus, (Hope, Bupr. p. 13); L. & G. ii. *Ag.* 30, pl. vii. fig. 38.

"Capite nigro, fronte aurantia; thorace punctato, tuberculato, nigro; elytris concoloribus, apicibus aurantiis, striato-punctatis, lineis duabus elevatis. Corpore infra æneo albisque capillis irrorato." (Hope).

Head and thorax black, the former covered with golden pubescence in front. Elytra black, with their apex for about two-fifths of their entire length croceous. Underside dull bronzy.

Head punctured, impressed between the eyes. Thorax

a quarter as broad again at the base as long; anterior margin rounded, three-quarters the length of the base; sides very slightly rounded, posterior angles produced and acute; base scarcely lobed; disk very deeply and rugosely punctured with an impressed dorsal line, which becomes rather deeper and wider as it approaches the base; the punctuation of the sides is rather deeper, on each may be perceived four slightly elevated rounded tubercles, and near each posterior angle is a shallow longitudinal fovea. Elytra a little more than twice as long as wide; sides sinuate below the shoulders; apex rounded; surface punctured; each elytron with four longitudinal ridges, between which are a series of large impressions; all the ridges unite near the apex, which however they do not reach. Underside and legs punctured, with a fine pubescence.

Length $5\frac{1}{2}$ lines; breadth $1\frac{3}{4}$ lines.

Hab. Swan River.

2. Nascio Parryi, (Pl. I. fig. 11).

Stigmodera Parryi, Hope, Tr. Ent. Soc. iv. 103.
Stigmodera Saundersii, Hope, Tr. Ent. Soc. iv. 213.

"Nigra, capite antice argenteo, antennis æneis, serratis. Thorax niger, punctatus. Elytra miniata, ad basin maculis ternis atris insignita, binis externis humeralibus et elongatis, tertioque infra scutellum posito, fere rotundato. Circa medium disci semicircularis macula ad suturam globum atrum format, apex elytrorum ater est et sub-bidentatus. Corpus infra chalybeo-æneum et punctatum, pedibus concoloribus." (Hope).

Head, thorax, and scutellum black. Elytra red, a spot on each shoulder, a diamond-shaped sutural spot below the scutellum, a large somewhat-circular spot situated about their centre, its edges not quite reaching the lateral margins, and the apex for a quarter of the entire length of the elytra, black. Underside, legs, and antennæ bronzy, covered with white hairs.

Head flat in front, deeply punctured. Thorax a quarter as broad again at the base as long; anterior margin produced in the centre and at the angles, about the same length as the base; sides and base straight; disk deeply punctured, with a large dorsal impression, the

sides of which have a silvery appearance; the sides also are slightly impressed above the posterior angles. Elytra wider than the thorax at the base, widest behind the middle; sides slightly sinuate below the shoulders, swelling out slightly behind the middle, and then converging in nearly straight lines to the apex, which is emarginate and bidentate; disk largely and deeply punctate-striate, each elytron with four elevated ridges. Underside and legs punctured, covered with an ashy pubescence.

Length 3½-5 lines; breadth 1-2 lines.

Hab. Adelaide.

Gen. ASTHRÆUS, Laporte and Gory.

(Stigmodera, *pars*, Hope.)

1. Asthræus Samouelli, (Pl. I. fig. 12).

Stigmodera Samouelli, (Hope, Bupr. p. 6).

"Thorace bronzeo, marginibus violaceis; elytris purpurascentibus, flavostictis. Corpore subtus violaceo." (Hope).

Head green in front, purple-brown on the vertex. Thorax purple-brown, sides (especially near the anterior angles) violaceous. Elytra purple-black, each with five flavous spots, one at the base near the suture, two placed abreast just below it, the exterior one touching the lateral margin; below these is a band touching the lateral margin but not the suture, and midway between this and the apex is an oval spot. Underside and legs cyaneous. Antennæ purple-black. Tips of the tibiæ, and the first joint of the tarsi, flavous.

Head punctured, hairy, with a slightly elevated dorsal line. Thorax not quite twice as broad as long, anterior margin nearly straight, two-thirds the length of the base; sides slightly curved; base largely bisinuate, with a narrow median lobe; disk punctured, hairy, the punctures on the sides rather larger. Elytra two-thirds as long again as wide, deeply punctate-striate, sides rounded, apices divergent, each armed with a long sutural spine, and a short one on the posterior margin just above it. Underside punctured, with a few scattered hairs.

Length 5 lines; breadth 2½ lines.

Hab. Australia.

Gen. EURYSPILUS, Lacordaire.

(Agrilus, *pars*, Hope.)

1. Euryspilus chalcodes, (Pl. I. fig. 13).

Agrilus chalcodes, (Hope, Bupr. p. 12).

Eurybia chalcodes, L. & G. ii. *Eur.* 1, pl. i. fig. 1.

"Æneus, caput cum thorace ruguloso-punctatum, fronte depressa; elytris punctatissimis, quatuor lineis lateribusque elevatis. Corpore infra concolore." (Hope).

The entire insect of a coppery bronze hue.

Head largely punctured, furrowed on the vertex, with a shallow round depression above the mouth. Thorax a quarter as broad again as long; anterior margin rounded, three-quarters the length of the base; sides rounded; base nearly straight; surface deeply punctured and transversely ribbed throughout; disk with an impressed dorsal line. Elytra twice and a quarter as long as wide; sides gradually converging to the apex, which is somewhat attenuate; apex of each extremely finely bidentate; disk deeply punctured; each elytron with four raised lines. Underside punctured, covered with very short white hairs.

Length $5\frac{1}{2}$ lines; breadth $1\frac{1}{2}$ lines.

Hab. Swan River.

Gen. CINYRA, Laporte and Gory.

(Cisseis, *pars*, Hope.)

1. Cinyra spilota, (Pl. IV. fig. 32).

Cisseis spilota, Hope, Tr. Ent. Soc. iv. 219.

"Viridi-ænea, thorace quatuor punctis albis notato, elytrisque variis minutis maculis ornatis; corpore infra æneo." (Hope).

Head fiery copper. Antennæ green. Thorax dark bronzy-brown, with four white spots, one near each angle, the two posterior touching the base. Elytra of the same colour as the thorax, each with twelve small white spots, two on the base, several dispersed along the margin, and four on the suture, the two upper of which are larger than the rest. Underside bronzy, with two white spots on each side of the breast, and on each abdominal segment.

Head very deeply punctured, with a few scattered short hairs. Thorax half as broad again at the base as long; anterior margin almost straight, two-thirds the length of the base; sides nearly straight, posterior angles acute; base straight; disk largely and deeply punctured, with a broad impressed dorsal line, with four small foveæ filled with white pubescence, situated as above. Elytra twice and a quarter as long as broad; sides straight for two-thirds of their length, then converging to the apex, which is rather pointed; disk striate and very deeply punctured, with numerous foveæ filled with white pubescence, situated as mentioned above. Underside and legs bronzy, with a pubescent fovea on each side of the thorax, breast, and each abdominal segment.

Length $5\frac{1}{2}$ lines; breadth $1\frac{3}{4}$ lines.

Hab. New Holland.

Gen. PLAGIOPE, (H. Deyr. MS.).

(Buprestis, *pars*, and Anthaxia, *pars*, Hope.)

1. Plagiope chrysochloris, (Pl. I. fig. 22).

Buprestis chrysochloris, (Hope, Bupr. p. 7); L. & G. i. *Bup.* 122, pl. xxxi. fig. 169.

"Thorace aurato, punctulato; elytris viridi-auratis, atro marginatis, disco postice flammanti. Corpore subtus æneo, nitido, antennis pedibusque viridibus." (Hope).

Above, golden copper, with greenish reflections. Beneath, golden green. Legs and antennæ green.

Head flat in front, deeply punctured, covered with short hairs. Thorax twice as broad at the base as long; anterior margin slightly produced, three-quarters the length of the base; sides nearly straight, with a slight bend just above the posterior angles; base straight; surface deeply punctured and transversely ridged; dorsal line indicated merely by a very faint depression near the anterior margin; near the posterior angles on each side there is rather a deeper one. Elytra half as long again as wide, finely and rugosely punctured, sides subparallel for two-thirds of their length; posterior margin finely denticulate. Underside and legs punctured, covered with white hairs.

Length 6 lines; breadth $2\frac{1}{2}$ lines.

Hab. Australia.

2. Plagiope cuprifera, (Pl. I. fig. 23).

Buprestis cuprifera, Kirby, Tr. Linn. Soc. xii. 457 ; L. & G. i. *Bup.* 119, pl. xxx. fig. 163.
Anthaxia ? cuprifera, (Hope, Bupr. p. 10).

Hab. Australia.

Gen. MELOBASIS, Laporte and Gory.

(Buprestis, *pars,* and Anthaxia, *pars,* Hope.)

1. Melobasis pyritosa, (Pl. I. fig. 14).

Buprestis pyritosa, Hope, Tr. Ent. Soc. iv. 214.

"Igneo-cuprea, thorace flammanti punctato, elytris subviolaceis, maculis fasciisque duabus aureis notatis, pedibusque viridibus." (Hope).

Head golden green. Thorax coppery, the sides with golden reflections. Scutellum golden. Elytra violet with green reflections ; an elongate spot below the scutellum, a spot on each shoulder, and two narrow bands on each elytron, one situated a little above the middle, the other midway between it and the apex, fiery copper; neither of these bands touches the suture, and the lateral margins between the shoulders and the first band are of the same colour. Underside golden-green, abdomen cyaneous, with its base green. Legs and antennæ cyaneous, the basal joint of the latter green.

Head flat in front, deeply punctured. Thorax nearly twice as broad at the base as long ; anterior margin nearly straight, its angles produced, three-fifths the length of the base ; sides slightly rounded; base almost straight ; disk punctured, with a very faint smooth dorsal line ; puncturation of the sides larger and denser. Elytra twice as long as wide, rather irregularly punctate-striate, sides subparallel till past the middle, then converging in nearly straight lines to the apex, which is rounded and denticulate, the denticulation continuing up the sides to about their centres; posterior suture elevated. Underside and legs punctured, the apical segment of the abdomen bidentate.

Length 5 lines; breadth 2 lines.

Hab. West Australia.

2. Melobasis gloriosa, (Pl. I. fig. 15).

Buprestis gloriosa, (Hope, Bupr. p. 7); L. & G. i. *Bup.* 123, pl. xxxi. fig. 170.

"Thorace viridi-æneo, elytris virescentibus, sutura, fascia media, macula humerali in singulo, marginibusque puniceis. Corpore infra viridi-æneo, nitido." (Hope).

Head and thorax coppery-green, the disk of the latter rather darker than the sides. Scutellum coppery. Elytra golden-green, lateral margin coppery-brown, the colour of the suture spreading out on the base so as to extend rather more than half-way across each elytron; just above the middle the colour of the suture again spreads out on each side, and in some specimens extends to the lateral margins; there is another similar commencement of a band just below the middle. Underside bright green. Antennæ cyaneous, their base green.

Head deeply and rugosely punctured. Thorax half as broad again at the base as long; anterior margin a little more than half as long as the base; sides much rounded in front, posterior angles slightly acute; base almost straight; disk punctured, with a very faintly impressed dorsal line, punctures on the sides deeper and closer together; sides slightly depressed near the posterior angles. Elytra twice as long as wide; sides subparallel for nearly two-thirds of their length; apex rounded; posterior margin denticulate; disk punctate-striate, the striæ vanishing on the sides; posterior suture elevated. Underside punctured, with a few scattered white hairs.

Length 6 lines; breadth 2 lines.

Hab. Swan River.

3. Melobasis splendida.

Buprestis splendida, Don. Ins. Austr. pl. i. fig. 4.
Anthaxia splendida, (Hope, Bupr. p. 10).

Hab. Australia.

4. Melobasis superba, (Pl. I. fig. 15 *a*).

Anthaxia superba, (Hope, Bupr. p. 9).
Buprestis superba, L. & G. i. *Bup.* 123, pl. xxxi. fig. 171.
"Caput cum thorace auratum, punctatum; elytris vio-

laceis serratis, viridi-trimaculatis. Corpore infra aureo nitido, antennis pedibusque violaceis nitidis." (Hope).

Head, thorax, and antennæ green, the latter coppery on the disk. Scutellum golden. Elytra purplish-brown, each marked with four golden spots, a small one just above the shoulder touching the base and the lateral margin, a long narrow one on the suture extending from the scutellum for about a quarter of the entire length of the elytra, a transverse band about the middle, reaching the lateral margin, but not touching the suture, and a round spot between it and the apex. Underside and thighs green, shining; tibiæ blue.

Head deeply punctured. Thorax twice as broad at the base as long; anterior margin half as long as the base, very slightly produced, its angles slightly embracing the head; sides rounded before the middle, posterior angles produced and acute; base straight; disk with a faintly raised dorsal line, largely and remotely punctured, the punctures becoming closer on the sides. Elytra twice as long as broad, punctate-striate, the interstices in some cases raised so as to form longitudinal ridges; sides subparallel for two-thirds of their length; posterior margin denticulate, apex rounded. Underside and legs punctured; each segment of the abdomen with two foveæ, one on each side near the anterior margin; the apical segment armed with four spines, the inner ones the longest.

Length 7 lines; breadth $2\frac{1}{2}$ lines.

Hab. Australia.

5. Melobasis cupriceps, (Pl. I. fig. 16).

Buprestis cupriceps, Kirby, Tr. Linn. Soc. xii. 457; (Hope, Bupr. p. 8); L. & G. i. *Bup.* 119, pl. xxx. fig. 164.

Buprestis viridinitens, Boisd. Voy. Astrol. ii. 94.

Buprestis iridescens, (Hope, Bupr. p. 8); L. & G. i. *Bup.* 121, pl. xxxi. fig. 167.

Hab. Australia, Port Jackson.

6. Melobasis propinqua, (Pl. I. fig. 17).

Buprestis propinqua, (Hope, Bupr. p. 8); L. & G. i. *Bup.* 120, pl. xxx. fig. 165.

Buprestis Porteri, Hope, Tr. Ent. Soc. iv. 215.

"Capite bronzeo, thorace cupreo punctato, elytris concoloribus, striato-punctatis. Corpore infra albotomentoso." (Hope).

The whole insect coppery, with greenish reflections.

Head very deeply punctured, clothed with long white hairs. Thorax half as broad again at the base as long; anterior margin slightly produced and ciliated, three-quarters the length of the base; sides very slightly rounded, posterior angles somewhat acute; base nearly straight; disk largely and remotely punctured, with a faintly impressed dorsal line, terminating at the base in a deep impression; the punctures on the side thickening and becoming larger. Elytra twice as long as wide, deeply punctured; sides nearly straight, posterior margin denticulate, apex rounded. Underside and legs punctured, covered with long white hairs; apical segment of the abdomen incised.

Length 3-4½ lines; breadth 1-1¼ lines.

Hab. Sydney, Swan River, Port Philip.

7. Melobasis metallifera, (Pl. I. fig. 18).

Buprestis metallifera, (Hope, Bupr. p. 8).

"Cuprea, thorace aurato punctato, elytris concoloribus striato-punctatis serrulatis. Corpore subtus cupreo-æneo nitido." (Hope).

Coppery-golden, with greenish reflections. Antennæ nearly black.

Head flat in front, deeply punctured, and covered with adpressed white hairs. Thorax three-quarters as broad again at the base as long; anterior margin slightly produced, two-thirds the length of the base; sides rounded in front, straight behind; base almost straight; disk punctured, with an impressed dorsal line; puncturation of the sides much closer. Elytra three-quarters as long again as broad, sides subparallel for not quite two-thirds of their length; apex slightly rounded, posterior margin denticulate; posterior suture elevated and its region depressed; disk strongly punctured, the punctures very close together on the sides. Underside punctured, entirely covered with long white adpressed hairs.

Length 6 lines; breadth 2½ lines.

Hab. Swan River.

8. Melobasis verna, (Pl. I. fig. 19).

Buprestis verna, Hope, Tr. Ent. Soc. iv. 214.

"Viridis, capite cupreo-æneo, thorace elytrisque aurato-virescentibus et punctatis; corpore subtus roseo-cupreo et pubescenti, pedibusque concoloribus." (Hope).

Green. Underside bronzy. Antennæ cyaneous.

Head flat in front, punctured, covered with long somewhat erect gray hairs. Thorax half as broad again as long; anterior margin produced, three-quarters the length of the base; sides rounded in front, straight behind; base nearly straight; disk with a slightly impressed dorsal line, deeply punctured, the punctures very close together on the sides. Elytra twice as long as wide; sides subparallel for a little more than half their length; apex rounded; posterior margin finely denticulate; disk deeply punctured, the punctures on the sides closer together; posterior suture elevated, its region depressed. Underside and legs punctured, covered with long adpressed white hairs.

Length 4½ lines; breadth 1½ lines.

Hab. Adelaide.

9. Melobasis Lathami, (Pl. I. fig. 20).

Buprestis Lathami, (Hope, Bupr. p. 8); L. & G. i. *Bup.* 120, pl. xxxi. fig. 166.

Buprestis serrulata, (Hope, *ibid.*).

"Nigro-ænea, thorace punctato, elytris concoloribus serrulatis, sutura lineis ternis elevatis marginibusque cupreis. Corpore infra nigro-æneo." (Hope).

Bronzy-green, the apex and lateral margins of the elytra slightly coppery. Antennæ cyaneous.

Head flat in front, deeply punctured. Thorax one quarter as broad again as long; anterior margin nearly straight, three-quarters the length of the base, its angles produced; sides slightly rounded for two-thirds of their length, then emarginate to the posterior angles, which are rather acute; base almost straight; disk punctured, the punctures on the sides deeper and closer together. Elytra twice as long as wide, sides swelling out very slightly to the middle, apex rounded; posterior margin denticulate; disk punctured, with three raised lines on

each elytron, the suture also raised. Underside and legs punctured, covered with white silvery pubescence.

Length 5 lines; breadth $1\frac{3}{4}$ lines.

Hab. Swan River.

10. Melobasis nervosa, (Pl. I. fig. 21).

Buprestis nervosa, Boisd. Voy. Astrol. ii. 77, pl. vi. fig. 8; (Hope, Bupr. p. 9); L. & G. i. *Bup.* 121, pl. xxxi. fig. 168.

Hab. New Holland.

Gen. MERIMNA, (H. Deyr. MS.).

(Belionota, *pars*, Hope.)

1. Merimna atrata, (Pl. IV. fig. 13).

Belionota ? atrata, (Hope, Bupr. p. 10).

Chrysobothris atrata, L. & G. ii. *Chrysob.* 58, pl. x. fig. 79.

"Totum corpus supra atrum, thorace subruguloso, elytris quatuor lineis elevatis, quinto basali ante medium disci sutura conjuncto. Corpore infra nigro-violaceo punctato, femoribus nigro-æneis." (Hope).

The entire insect dull black.

Head punctured, with a slightly raised smooth dorsal line. Thorax half as broad again as long; anterior margin slightly produced in the centre and at the angles, finely ciliate, three-fifths the length of the base; sides slightly rounded in front, then nearly straight to the posterior angles; base with a shallow median lobe; disk punctured and transversely ridged, with a faint dorsal line, impressed at the base, but smooth and slightly raised in front, the puncturation rather denser on the sides. Elytra three-quarters as long again as wide; sides sinuate above the middle; apex of each with a slight point; surface punctured and irregularly rugose; each elytron with four smooth raised lines of which the lateral one alone reaches the posterior margin. Underside, legs, and antennæ, punctured, with a few short hairs; the three first segments of the abdomen with a fovea on each side.

Length 11 lines; breadth 4 lines.

Hab. Australia.

Gen. ANILARA, (H. Deyr. MS.).

(Anthaxia, *pars*, Hope.)

1. Anilara Adelaidæ, (Pl. IV. fig. 12).

Anthaxia Adelaidæ, Hope, Tr. Ent. Soc. iv. 216.

"Nigro-ænea; thorace cupreo-æneo, subtilissime punctato, elytris nigricantibus violaceoque colore tinctis. Corpus infra atro-æneum, antennis pedibusque concoloribus." (Hope).

Dull bronzy.

Head very largely punctured, with an impressed line on the vertex. Thorax twice as broad at the base as long; anterior margin slightly produced in the centre and at the angles, three-quarters the length of the base; sides diverging rapidly for a third of their length, then slightly rounded to the posterior angles; base straight; disk punctured, punctures on the sides very large. Elytra one quarter as long again as wide, sides subparallel for a little more than half their length, then rounded to the apex; disk finely rugose; suture elevated posteriorly. Underside and legs punctured, with a few scattered hairs.

Length $1\frac{1}{4}$ lines; breadth $\frac{1}{2}$ a line.

Hab. Adelaide.

Gen. NEOCURIS, (H. Deyr. MS.).

(Anthaxia, *pars*, and Stigmodera, *pars*, Hope.)

1. Neocuris Fortnumi, (Pl. IV. fig. 10).

Anthaxia Fortnumi, Hope, Tr. Ent. Soc. iv. 216.

"Cyanea, thorace concolori, lateribus aurato-punctatis; elytris ad scutellum auro-fulgentibus, maculâ irregulari aureâ post humeros locatâ; corpore subtus violaceo, pedibus concoloribus." (Hope).

Head cæruleous. Thorax and elytra dark cyaneous; the former nearly black, its posterior angles fiery copper colour, the colour extending along its sides for about two-thirds of their length; the latter with a somewhat triangular sutural coppery red spot, commencing at the scutellum, which is green, and extending for about a third of the entire length of the elytra, and with a long

spot of the same colour just below the shoulders. Underside cyaneous, with green reflections; legs purple; sides and posterior portion of the breast, and the lateral margins of the abdomen, coppery. Antennæ cyaneous.

Head punctured, with a faint impression between the eyes. Thorax three-quarters as broad again at the base as long; anterior margin slightly emarginate, three-quarters the length of the base; sides rounded; base with a shallow median lobe; disk deeply punctured, the punctures deeper on the sides; just above the scutellum is a very small round impression. Elytra one quarter as long again as wide; sides subparallel for two-thirds of their length; apex of each rounded and denticulate; disk punctured, with a somewhat scaly appearance. Underside and legs punctured, with a few scattered hairs.

Length 3 lines; breadth 1 line.

Hab. Australia.

2. Neocuris Guerinii, (Pl. IV. fig. 11).

Stigmodera Guerinii, Hope, Tr. Ent. Soc. iv. 103.

"Violacea, thorace nigro, marginibus auratis. Elytra antice et postice nigro-violacea, in medio fasciâ latâ flavâ insignita. Corpus infra læte violaceum, pedibus concoloribus." (Hope).

Head green; thorax and elytra cyaneous; the former with its sides fiery copper colour, the latter with a broad flavous band situated a little above their middle, widening as it approaches the lateral margins. Underside and legs cyaneous. Antennæ green.

Head punctured, depressed between the eyes. Thorax twice as broad at the base as long; anterior margin emarginate, three-quarters the length of the base, sides rounded; base slightly lobed; disk punctured, punctures on the sides deeper. Elytra one quarter as long again as wide, sides subparallel for two-thirds of their length; apex of each largely rounded and finely denticulate; disk rugosely punctured, presenting rather a scaly appearance; apical segment of the abdomen above with a deep round fovea, its posterior margin very finely denticulate. Underside rugosely punctured, with a few scattered hairs.

Length 3 lines; breadth $1\frac{1}{4}$ lines.

Hab. Australia.

Gen. CURIS, Laporte and Gory.

(ANTHAXIA, *pars*, Hope.)

1. CURIS CALOPTERA, (Pl. IV. fig. 7).

Buprestis caloptera, Boisd. Voy. Astrol. ii. 93.
Stigmodera caloptera, L. & G. *Stig.* ii. 48, pl. xi. fig. 58.
Anthaxia dives, (Hope, Bupr. p. 9).
Hab. Australia.

2. CURIS AURIFERA, (Pl. IV. fig. 8).

Anthaxia aurifera, (Hope, Bupr. p. 9).
Stigmodera aurifera, L. & G. ii. *Stig.* 49, pl. xi. fig. 59.

"Capite nigro-violaceo, inter oculos foveolato; thorace purpurascente, linea media marginibusque aureis; elytris serratis, striato-punctatis purpurascentibus, sutura, lateribus externis ad medium disci auratis, nitidis. Corpore infra nigro-violaceo, annulis abdominis utrinque flavo-pilosis, antennis pedibusque cyaneis." (Hope).

Head green. Thorax cyaneous, with a dorsal line and the sides golden. Elytra of the same colour as the thorax, the suture and lateral margins just below the shoulders golden, the apex coppery. Underside green.

Head deeply punctured, impressed between the eyes. Thorax half as broad again as long; anterior margin slightly produced, three-quarters the length of the base; sides rounded, posterior angles acute; base nearly straight; disk punctured, with a broad impressed dorsal line; sides more deeply punctured than the disk, each with a small round fovea midway between the anterior margin and base. Elytra twice as long as wide; sides very slightly sinuate above the middle, apex somewhat attenuate and rounded, posterior margin finely denticulate, disk largely and irregularly punctured. Underside and legs punctured, the sides of each abdominal segment near the anterior margin, with a white pubescent spot.

Length $7\frac{1}{2}$ lines; breadth $2\frac{1}{2}$ lines.

Hab. Australia.

Gen. CASTALIA, Laporte and Gory.

(Strigoptera, *pars*, Hope.)

1. Castalia bimaculata, (Pl. I. fig. 24).

Buprestis bimaculata, Oliv. Ent. ii. 88, pl. xii. fig. 140.
Strigoptera bimaculata, (Hope, Bupr. p. 11).
Castalia bimaculata, L. & G. ii. *Cas.* 2, pl. i. fig. 1.
Hab. Australia.

Gen. CALODEMA, Laporte and Gory.

(Stigmodera, *pars*, Hope, *olim.*)

1. Calodema regalis, (Pl. IV. fig. 9).

Stigmodera Kirbii, (Hope, Bupr. p. 2).
Stigmodera regalis, L. & G. ii. *Stig.* 71, pl. xvi. fig. 88.
Calodema Kirbii, Hope, Col. Man. iii. 173, fig. frontisp.

"Flava; thorace viridi, maculis duabus ovalibus puniceis fossulisque binis in medio disci positis; elytris flavis, marginibus internis viridibus. Corpus infra viride splendidum, annulis abdominis utrinque flavomaculatis." (Hope).

Head and thorax shining green; the latter with the dorsal line slightly darker, and an ovate longitudinal red spot on each side near the lateral margin. Scutellum green. Elytra flavous, with the suture, the posterior lateral margins, and four fine lines on each, black. Underside and legs green, shining; the thorax with a spot on each side as on its upper surface, and each of the last three segments of the abdomen with a small yellow spot on each side.

Head deeply punctured with a slightly impressed dorsal line. Thorax three-quarters as broad again as long; anterior margin three-fifths the length of the base, slightly produced in its centre, and very much so at its angles; sides diverging rapidly till about the middle, then slightly curved to the posterior angles; base with a deep narrow median lobe; disk finely punctured, the puncturation of the sides deeper and larger, especially near the posterior angles. Elytra nearly twice as long as wide, finely punctured, the punctures arranged in irregular rows; sides slightly rounded; apex of each sub-bidentate. Underside finely punctured, the legs with a few scattered hairs.

Length 19 lines; breadth 7 lines.

Hab. Australia.

Gen. STIGMODERA, Eschscholtz.

(Stigmodera ; Buprestis, *pars ;* Conognatha, *pars ;* Hope.)

1. Stigmodera macularia, (Pl. I. fig. 25).

Buprestis macularia, Don. Ins. N. Holl. *Bupr.* pl. ii. fig. 2.
Stigmodera macularia, (Hope, Bupr. p. 1) ; L. & G. ii. *Stig.* 8, pl. i. fig. 4.

Hab. Australia.

2. Stigmodera Gorii, (Pl. I. fig. 26).

Stigmodera Gorii, (Hope, Bupr. p. 1). *S. Goryi,* L. & G. ii. *Stig.* 7, pl. i. fig. 3.
Stigmodera Curtisii, (Hope, Bupr. p. 2).

"Aurantia, thorace æneo punctato quasi vermibus eroso, elytris flavis punctis impressis confluentibus atris. Corpus subtus atro-æneum cinereisque capillis obsitum." (Hope).

Head, thorax, scutellum, underside, legs, and antennæ, æneous-black. Elytra testaceous.

Head deeply punctured, with an impressed line between the eyes, and a few scattered white hairs in front. Thorax three-quarters as broad again as long ; anterior margin slightly produced, half as long as the base ; sides rounded above the middle; base slightly lobed ; disk deeply punctured, the punctures very irregular and grouped together so as to give the surface a worm-eaten appearance, puncturation larger on the sides. Elytra three-quarters as long again as wide ; sides converging from below the middle ; apex of each bidentate ; the entire surface scattered over with large punctures, which are somewhat arranged in lines near the suture, but very irregular on the sides. Underside and legs punctured, the former covered with long white hairs, the hairs on the latter shorter.

Length 16 lines ; breadth 6 lines.

Hab. Australia.

S. Curtisii has the puncturation of the thorax so faint as to give it a smooth and scarcely worm-eaten appearance.

3. Stigmodera sanguinosa, (Pl. I. fig. 27).

Hope, Tr. Ent. Soc. iv. 210.

"Ænea, thorace nigricanti, elytris sanguineis, punctis viridibus fortiter excavatis; corpore infra aurato, æneis griseisque pilis obsito, pedibus antennisque cupreis." (Hope).

Head and thorax green, the lateral margins of the thorax golden. Elytra red-brown, the bottom of the pits with which its surface is covered brilliantly golden. Underside, legs, and antennæ, golden copper.

Head flat, punctured, covered with long white hairs; vertex with a slight median furrow. Thorax twice as broad as long; anterior margin emarginate, scarcely half as long as the base; sides rounded; base broadly and shallowly lobed; disk largely punctured, sides rugose. Elytra widest at the shoulder, not quite twice as long as wide; sides gradually curved to the apex, which is somewhat acuminate but blunt; surface covered with small irregular pits placed close together, the raised lines between them bearing a few scattered punctures. Underside of the thorax, sides of the abdominal segments and a band across the middle of each, and legs, punctured and villose; the rest brilliantly burnished.

Length 10 lines; breadth 4 lines.

Hab. Swan River.

4. Stigmodera Roei, (Pl. II. fig. 2).

Stigmodera Roei, (Hope, Bupr. p. 2).

Stigmodera cancellata, L. & G. ii. *Stig.* 10, pl. ii. fig. 6, (*nec* Donov.).

"Viridis, clypeo antennis auratis; thorace varioloso virescenti; elytris concoloribus, fortitur insculptis, minio marginatis, sex maculis magnis miniatis medio disci positis. Corpus subtus auratum, splendidum, albisque capillis sparsim obsitum." (Hope).

Above, green. Elytra with the margins, apex, and three spots on each, sanguineous; of these spots one almost touches the base, the second is a little more than one-third of the entire length of the elytra from the base, and the third about one-third of their length from the apex. Underside, legs, and antennæ, coppery-golden.

Head deeply punctured, hairy, with an elevated smooth dorsal line on the vertex. Thorax twice as broad at the base as long; anterior margin nearly straight, half as long as the base; sides rounded; base almost straight; disk very strongly punctured, sides almost rugose. Elytra three-quarters as long again as wide; sides straight for a little more than half their length, then converging to the apex, which is slightly pointed; disk deeply and regularly pitted, the interstices between the pits remotely punctured. Underside and legs punctured, hairy, the segments of the abdomen punctured only on their posterior margins.

Length 1·4 lines; breadth 6 lines.

Hab. Australia.

This species is clearly distinct from *S. cancellata*, Don., and may be recognized by its shorter form, by the disk of the thorax being more strongly punctured, by the absence of a distinct dorsal line, and by other minor differences.

5. Stigmodera cancellata, (Pl. II. fig. 1).

Buprestis cancellata, Don. Ins. N. Holl. *Bup.* pl. i. fig. 2.
Stigmodera cancellata, (Hope, Bupr. p. 2).
Buprestis Dejeaniana, Boisd. Voy. Astrol. ii. 63, pl. vi. fig. 6.
Stigmodera Dejeanii, (Hope, Bupr. p. 7).
Hab. Australia.

6. Stigmodera gratiosa, (Pl. II. fig. 3).

Chevr. Rev. Zool. 1843, p. 201.
Stigmodera smaragdina, Hope, Tr. Ent. Soc. iv. 283.
Hab. Australia.

7. Stigmodera Parryi, (Pl. II. fig. 4).

Hope, Tr. Ent. Soc. iv. 210.

"Brunneo-rubra, thorace æneo rubroque colore variegato, elytris brunneo-rubris; corpore infra eroso-punctato et æneo, pedibusque concoloribus." (Hope).

Head and antennæ bronzy. Thorax and elytra brown, the former with a bronzy tint. Underside and legs bronzy.

Head punctured, with an impressed line on the vertex, covered with short hairs. Thorax twice as wide at the base as long; anterior margin produced, not quite half as long as the base; sides very slightly rounded, posterior angles acute; base nearly straight; disk confluently punctured, wth a smooth dorsal line, sides granulate. Elytra not so wide as the base of the thorax, deeply striate, two-thirds as long again as wide; sides sinuate above the middle; apex rounded. Underside shining, the sides of the breast and abdomen rugose; legs punctured and hairy.

Length 14½ lines; breadth 6 lines.

Hab. New Holland.

8. Stigmodera flavocincta, (Pl. II. fig. 5).

(Hope, Bupr. p. 1); L. & G. ii. *Stig.* 6, pl. i. fig. 2.

"Rufobrunnea, thorace nigro-chalybeo flavo-marginato variolisque eroso; elytris rufobrunneis, externe flavo-cinctis. Corpus subtus æneum punctatum flavisque capillis obsitum, antennis pedibusque æneis." (Hope).

Head bronzy. Thorax bluish black with the lateral margins yellow. Elytra reddish brown, with the margins flavous. Underside and legs bronzy, the margins of the thorax and abdomen yellow.

Head rugose, covered with long white hairs. Thorax twice as broad at the base as long; anterior margin produced, not quite half as long as the base; sides much rounded, posterior angles acute; base trisinuate; disk largely and deeply punctured, rugose in front and on the sides. Elytra striate, the interstices vermiculately rugose, three-quarters as long again as wide, considerably narrower than the thorax at the base; sides swelling to the shoulders, then slightly sinuate above the middle; apex of each elytron with a short spine. Underside and legs punctured and hairy, the former slightly rugose.

Length 16 lines; breadth 6½ lines.

Hab. Australia.

9. Stigmodera grandis, (Pl. II. fig. 6).

Buprestis grandis, Don. Ins. N. Holl. *Bup.* pl. ii. fig. 1.
Stigmodera grandis, (Hope, Bupr. p. 1); L. & G. ii. *Stig.* 6, pl. i. fig. 1.

Hab. Australia.

10. Stigmodera limbata, (Pl. II. fig. 7).

Buprestis limbata, Don. Ins. N. Holl. *Bup.* pl. ii. fig. 4.
Stigmodera limbata, (Hope, Bupr. p. 2), (*nec* L. & G.).
Hab. Australia.

11. Stigmodera suturalis, (Pl. II. fig. 8).

Buprestis suturalis, Don. Ins. N. Holl. *Bup.* pl. ii. fig. 5.
Stigmodera suturalis, (Hope, Bupr. p. 2) ; L. & G. ii. *Stig.* 18, pl. iv. fig. 16.
Hab. Australia.

12. Stigmodera Fortnumi, (Pl. II. fig 9).

Hope, Tr. Ent. Soc. iv. 102.

"Violacea, capite viridi, thorace punctulato, lateribus flavo-marginatis, medio purpurascenti. Elytra violacea, striato-punctata, ternisque latis fasciis flavis insignita. Corpus infra viride, lateribus thoracis, pectore, segmentisque abdominis utrinque flavo notatis. Pedes virides." (Hope).

Head greenish in front, purple on the vertex. Thorax purple, the lateral margins widely yellow; scutellum bright blue. Elytra violet, with three straight yellow bands, one at the base, the second situated about one-third of the entire length of the elytra from the base and connected with the basal band along the margin, the third near the apex and touching neither the suture nor the lateral margin. Underside green, the sides of the thorax, two spots on each side of the breast, a spot on each side of the four first abdominal segments, and the whole of the apical segment, flavous; legs and antennæ green, with purple reflections.

Head rugosely punctured, with a slight vertical furrow and an impression in front. Thorax twice as broad at the base as long; anterior margin slightly ciliate, half as long as the base; sides rounded; base nearly straight; disk punctured, with a smooth slightly elevated dorsal line. Elytra deeply striate, half as long again as wide; sides sinuate below the shoulders; apex widely truncate. Underside punctured and slightly hairy.

Length 18 lines; breadth 8 lines.

Hab. Adelaide.

13. Stigmodera Mitchellii, (Pl. II. fig. 10).

Hope, Tr. Ent. Soc. iv. 209.

Stigmodera Stricklandi, Hope, Tr. Ent. Soc. iv. 220, var.

"Flava, thorace olivaceo-æneo, marginibus croceis, fossula utrinque parum distincta, elytrisque violaceis et quatuor fasciis flavis ornatis; corpore infra cyaneo, pedibusque concoloribus." (Hope).

Head and thorax purplish black, the sides of the thorax yellow. Elytra yellow, with three black bands, one below the base, the second (a wider one) at the middle, the third midway between it and the apex, which is also of the same colour; these bands all unite on the suture; the median band in the specimen before me quite touches the lateral margins, and the other two do not, but I find these bands differ so much in other individuals that I think little specific value should be attached to them. Underside yellow, the centre of the thorax and of the first three abdominal segments, as well as their posterior margins, greenish-black.

Head deeply punctured, vertex furrowed. Thorax widest about the middle, three-quarters as broad again at the base as long: anterior margin slightly elevated, emarginate, not quite two-thirds the length of the base; sides much rounded, each margin bordered internally with an impressed line; base nearly straight; disk deeply and rugosely punctured, with a faintly elevated dorsal line. Elytra nearly twice as long as wide; sides sinuate below the shoulders; apex rounded; surface punctured, deeply striate, interstices near the base vermiculately rugose. Underside and legs punctured, the latter with a few scattered hairs.

Length 11½ lines; breadth 5 lines.

Hab. Swan River.

14. Stigmodera variabilis, (Pl. II. fig. 11, 12).

Buprestis variabilis, Don. Ins. N. Holl. *Bup.* pl. i. fig. 1.

Stigmodera variabilis, (Hope, Bupr. p. 2); L. & G. ii. *Stig.* 11, pl. ii. fig. 7, 8.

Stigmodera nigripennis, (Hope, *l. c.*); L. & G. ii. *Stig.* 15, pl. iii. fig. 12, var.

Buprestis Kingii, MacL., King's Voy. App. p. 441.

Stigmodera Kingii, (Hope, *l.c.*).

Stigmodera unifasciata, (Hope, Bupr. p. 7); L. & G. ii. *Stig.* 20, pl. iv. fig. 19.

Hab. Australia.

15. Stigmodera sanguinipennis, (Pl. II. fig. 13).

(Hope, Bupr. p. 2); L. & G. ii. *Stig.* 16, pl. iii. fig. 13.

"Sanguinea, capite nigro, thorace punctato macula media atra, lateribus thoracis elytrorumque sanguineis, apice cyaneo. Corpus subtus concolor, lateribus abdominis sanguineis." (Hope).

Head and antennæ steel blue. Thorax black on the disk, red at the sides. Elytra bright red, with the apex cyaneous. Underside cyaneous, the sides of the thorax and abdomen red; legs blue.

Head deeply punctured and covered with short yellowish hairs. Thorax at the base a quarter as broad again as long; anterior margin produced, half as broad as the base, the angles slightly enclosing the head; sides much rounded till they reach the middle, thence gradually converging to the posterior angles, which are slightly acute; base bilobed; disk slightly punctured, the punctures becoming deeper and closer towards the sides. Elytra punctate-striate, twice as long as broad, widest at the shoulders; sides very slightly sinuate above the middle, whence they gradually converge to the apex, which is armed with two short spines. Underside and legs punctured, hairy.

Length 14 lines; breadth 5 lines.

Hab. Australia.

16. Stigmodera hæmatica, (Pl. II. fig. 14).

Hope, Tr. Ent. Soc. iv. 210.

"Sanguinea, capite atro-æneo, thorace in medio nigro-maculato; corpore infra sanguinoso, pectore pedibusque cyaneis." (Hope).

Head black. Thorax red, with the disk black. Elytra red, with the apex just tipped with cyaneous, which colour extends along the suture to about the middle. Underside red, the centre of the thorax and portions of the breast and legs bronzy. Legs above, and antennæ, cyaneous.

Head deeply punctured, channelled between the eyes, covered with dense long hairs. Thorax not quite twice as broad as long; anterior margin very slightly produced, half as long as the base; sides diverging to their middle, then straight to the posterior angles, which are rounded; base slightly lobed; disk slightly punctured, punctures

very deep on the sides, with a slight dorsal line, on each side of which is a small round depression situated about two-fifths of the entire length of the thorax from the anterior margin. Elytra twice as long as broad; sides subparallel for two-thirds of their length; apex of each armed with a spine; disk striate, the interstices on the sides somewhat rugose. Underside very deeply and closely punctured, clothed with long white hairs.

Length 15 lines; breadth 6 lines.

Hab. Swan River.

17. Stigmodera Spencii, (Pl. II. fig. 15).

(Hope, Bupr. p. 2); L. & G. ii. *Stig.* 13, pl. iii. fig. 9.
Temnognatha egregia, Bohem. Eugen. Resa, Ins. p. 60.

"Thorace æneo, elytris striato-punctatis nigro-violaceis testaceo-trifasciatis. Corpus subtus æneum, pectore lateribus abdominis flavo-notatis, pedibusque viridi-æneis." (Hope).

Head and thorax coppery golden. Scutellum green. Elytra flavous, with their base, a band situated about one-fifth of their length from it, and another midway between it and the apex, cyaneous; the apex also for about one-fourth of the entire length of the elytra is of the same colour; the two lower bands and the apex are connected on the margins. Underside flavous, the sides of the thorax, breast, and abdominal segments green; legs and antennæ of the same colour.

Head punctured, with a longitudinal impression on the vertex. Thorax three-fifths as broad again as long; anterior margin slightly produced in the centre and at the angles, not quite half as long as the base; sides much rounded; base with a shallow median lobe; disk deeply punctured, with a slight smooth dorsal line. Elytra punctate-striate, punctures on the sides irregular; not quite twice as long as wide; sides slightly sinuate above the middle; apex truncate, with an external tooth on each elytron. Underside and legs punctured.

Length 15 lines; breadth 6 lines.

Hab. Australia.

18. Stigmodera signaticollis, (Pl. II. fig. 16).

Hope, Tr. Ent. Soc. iv. 209.
Stigmodera conspicillata, White, Ann. & Mag. N. H. xii. 344.

" Flava, thorace viridi-violaceo, utrinque flavo-maculato, elytris tribus fasciis violaceis, pedibus viridibus." (Hope).

Head, antennæ, and thorax bluish green, the latter with a yellow spot on each side, touching the lateral margin and sloping towards the base. Elytra yellow, the base narrowly bordered with violet, two bands of the same colour, one very slightly declining from the shoulder to the suture, and situate about a quarter of the entire length of elytra from the base, the other below the middle and almost straight; the apex for about a fifth of their length is also violet, and this is connected along the margin with the second band. Underside yellow, the centre of the thorax, a triangular spot on the breast, the posterior margin and a spot on each side near the anterior margin of each abdominal segment, and the legs, green.

Head punctured, hairy, the vertex with a faintly impressed line. Thorax three-quarters as broad again at the base as long; anterior margin produced, not quite half as long as the base; sides rounded, posterior angles acute; disk convex, deeply punctured, with a smooth impressed dorsal line. Elytra considerably wider than the thorax, striated, sinuate above the middle; apex widely truncate. Underside shining, punctured, the thorax and breast slightly hairy; legs punctured.

Length 14 lines; breadth 6 lines.

Hab. Swan River.

19. Stigmodera cyanura, (Pl. II. fig. 17).

Hope, Tr. Ent. Soc. iv. 211.

Stigmodera conspicillata, var., White, Ann. & Mag. N. H. xii. 344.

" Flava, thorace viridi-nitido, maculâ flavâ parvâ utrinque positâ, elytris flavis, apicibusque late cyaneis; corpore infra flavo viridique colore variegato." (Hope).

Head, thorax, and antennæ bright green; the thorax with two small transverse yellow spots, one on either side above the posterior angle. Scutellum green. Elytra flavous, with the apex for about a quarter of their entire length cyaneous. Underside of the thorax green, with a large irregular patch of yellow on each side; the breast also green, with an oblong yellow spot on each side;

abdomen yellow, the lower edge of each segment, and a spot on each side near the upper edge, green. Legs green.

Head deeply punctured, hairy in front. Thorax three-quarters as broad again at the base as long; anterior margin ciliate, nearly straight, half as long as the base; sides gradually rounded; base slightly bisinuate; disk very convex, shining, covered with rugose punctures. Elytra deeply striate, almost twice as long as broad; sides slightly sinuate below the shoulders, widest a little below the middle, whence they gradually converge to the apex, which is somewhat truncate, with a very obtuse external angle. Underside and legs slightly hairy and punctured.

Length 11 lines; breadth $4\frac{1}{2}$ lines.

Hab. Swan River.

20. Stigmodera Yarrellii, (Pl. II. fig. 18).

(Hope, Bupr. p. 3); L. & G. ii. *Stig.* 14. pl. iii. fig. 11. (*S. Yarelli*). *

Stigmodera flavipennis, Gehin, Mém. Soc. Hist. Nat. Metz, 1855.

Stigmodera elegans, Gehin, *ibid.*

"Elytris striato-punctatis nigro-violaceis testaceo-4-fasciatis, thorace punctato cyaneo, lateribus flavis. Corpus infra luteum, annulis abdominis postice pedibusque viridibus." (Hope).

Head and thorax cyaneous, the lateral margins of the thorax, and a small spot just above the scutellum yellow. Elytra yellow, with three bluish-black bands, the first extending from one shoulder to the other in an almost

[* Laporte and Gory adopted the name of this insect from Hope, but spelt it at one time *Yarelli*, at another *Yarellii*, always with one "r." But some there are who carry their advocacy of the law of priority in nomenclature to such an extreme, that they would insist upon the perpetuation of this blunder, and would condemn posterity throughout all time to write *Stigmodera Yarelli* as the name of an insect dedicated to William Yarrell. Truly, this is keeping the letter of the law with a vengeance! Under a semblance of obedience to rule, the rule itself is perverted; the reason and object of the law are lost sight of, it is applied to a case beyond its scope, it is strained to produce a result never intended by its framers. Every law has limits beyond which it cannot reasonably be carried; the law of priority in nomenclature is no exception, but requires to be rationally interpreted and rationally applied. To make it the means of enforcing the perpetuation of an error in orthography is to misapply the rule, and the result is an absurdity. Moral sense denounces the misapplication, common sense rejects the result.—J. W. D., *Sec. Ent. Soc.*]

semicircular curve, the second straight, and reaching the margins, the third (a shorter one) not touching the margins; apex bluish-black. Underside yellow; a spot on each side of the thorax, the posterior margin of each abdominal segment, and the legs, green.

Head deeply punctured, with an impressed line on the vertex. Thorax widest behind the middle, not quite twice as broad at the base as long; anterior margin slightly rounded, half as long as the base; sides rounded; base nearly straight; disk punctured, with a smooth dorsal line, which is met at the base by a small fovea. Elytra striate, twice as long as wide, sides almost straight, apex rounded. Underside shining, very finely punctured, the punctures coarser on the legs, which have also a few short white hairs.

Length 12 lines; breadth 4 lines.

Hab. Swan River.

21. Stigmodera semicincta, (Pl. II. fig. 19).

(Hope, Bupr. p. 3); L. & G. ii. *Stig.* 19, pl. iv. fig. 17.

"Nigra, capite cyaneo, thorace punctato, in medio viridi, marginibus violaceis; elytris nigris striato-punctatis, lateribus externis flavis. Corpus infra cyaneum." (Hope).

Head and thorax cyaneous. Scutellum bright green. Elytra dark brown, the margins flavous. Underside and legs cyaneous. Antennæ bronzy.

Head punctured, deeply impressed between the eyes. Thorax widest behind the middle, two-thirds as broad again as long; anterior margin half as long as the base, its centre and angles slightly produced; sides diverging till just past the middle, then rounded and straight to the posterior angles; base slightly lobed; disk largely and deeply punctured, with a scarcely-visible smooth dorsal line, the punctures in many cases confluent on the sides, each of which has a slight impression near the posterior angle and almost touching the lateral margin. Elytra regularly striate, twice as long as broad, shoulders slightly prominent, sides scarcely sinuate below them; the apex of each with an external spine. Underside and legs punctured, covered with short whitish hairs.

Length 9½ lines; breadth 4 lines.

Hab. Australia.

22. Stigmodera undulata, (Pl. II. fig. 20).

Buprestis undulata, Don. Ins. N. Holl. *Bup.* pl. i. fig. 5.
Stigmodera undulata, (Hope, Bupr. p. 3) ; L. & G. ii. *Stig.* 24, pl. v. fig. 23.
Castiarina Laportei, Bohem. Eugen. Resa, Ins. p. 61.
Hab. Australia.

23. Stigmodera cruenta, (Pl. II. fig. 21).

(Hope, Bupr. p. 4) ; L. & G. ii. *Stig.* 29, pl. vi. fig. 30.

"Thorace bronzeo, elytris sanguineis, ternis fasciis violaceis, corpore infra concolori, abdomine sanguineo." (Hope).

Head, thorax, and antennæ bronzy. Elytra flavous, the margins and base blood-red, traversed by three black bands, one just below the base, the second below the middle, and the third at the apex. Underside of thorax, breast and legs cyaneous, abdomen sanguineous.

Head very largely and deeply punctured. Thorax one quarter as broad again as long; anterior margin straight, slightly elevated at the sides ; base almost twice as long as the anterior margin ; sides diverging till they pass the middle, then straight to the posterior angles, which are right angles ; disk flat posteriorly, with a faint indication of a smooth dorsal line. Elytra strongly and deeply punctate-striate, twice as long as broad ; sides slightly sinuate ; apex largely rounded. Underside and legs punctured, hairy.

Length 6 lines ; breadth $2\frac{1}{4}$ lines.

Hab. Australia.

24. Stigmodera Klugii, (Pl. II. fig. 22).

(Hope, Bupr. p. 4) ; L. & G. ii. *Stig.* 27, pl. vi. fig. 28.

"Thorace punctato, cyaneo, nitido ; elytris purpurascentibus, striatis, crebre punctulatis, apice subserratis, humeris flavo-maculatis binisque fasciis concoloribus ornatis. Corpore infra cyaneo." (Hope).

Cyaneous. Elytra with a flavous spot above each shoulder touching the base and the lateral margins, and two bands of the same colour, one just above the middle, the other about one quarter of the length of the elytra from the apex. Legs with green reflections.

Head deeply punctured, channelled between the eyes.

Thorax not quite twice as broad as long; anterior margin nearly straight and slightly raised, half as long as the base; sides diverging rapidly for about two-thirds of their length, then parallel to the base, which is very slightly lobed; disk largely and deeply punctured. Elytra twice as long as wide, punctate-striate, the interstices also punctured, especially on the sides; sides sinuate below the shoulders, swelling out considerably below the middle; apex very finely emarginate. Underside punctured, with a few white hairs.

Length 7½ lines; breadth 3½ lines.

Hab. Australia.

25. Stigmodera amabilis, (Pl. III. fig. 1).

(Hope, Bupr. p. 3); L. & G. ii. *Stig.* 19, pl. iv. fig. 18.

"Flava, capite cyaneo; thorace punctato medio concolori, lateribus externis miniatis; elytris striato-punctatis flavis, sutura vittaque in singulo violaceis, lateribus externe sanguineis. Corpus subtus cyaneum, ultimo segmento abdominis miniato." (Hope).

Head and thorax cyaneous, the latter with the margins widely dull-orange. Scutellum blue. Elytra dull orange, the base and suture broadly margined with blue, the colour of the latter swelling out near the apex so as to form a somewhat square spot; a vitta of the same colour on each elytron reaches from the shoulders, running nearly parallel to the side, and ending about two-thirds of its entire length from the base; near their terminations they slightly swell out, so as to assume a clubbed shape; posterior margin slightly tinged with red. Underside blue-green, the sides of the thorax and the two last abdominal segments orange; legs and antennæ cyaneous, tibiæ greenish.

Head punctured, widely depressed between the eyes. Thorax widest behind the middle, not quite two-thirds as broad again as long; anterior margin slightly elevated, half as long as the base, its angles produced; sides diverging in nearly straight lines for about two-thirds of their length, then very slightly rounded to their posterior angles, which are acute; disk largely and deeply punctured, slightly raised in front, with a dorsal line visible only at the base, where it is slightly raised; the region on each side of it depressed. Elytra three-quarters as long again as wide, rather narrower than the thorax at

the base, widest behind the middle, punctate-striate, the interstices also punctured; shoulders angulose, sides sinuate above the middle; apex of each narrowly punctate, with an external tooth. Underside and legs punctured, the punctures of the legs very fine.

Length 8 lines; breadth $2\frac{3}{4}$ lines.

Hab. Australia.

26. Stigmodera Erythromelas, (Pl. III. fig. 2).

Buprestis Erythromelas, Boisd. Voy. Astrol. ii. 75, pl. vi. fig. 7; L. & G. i. *Bup.* 124, pl. xxxi. fig. 173.
Stigmodera Erythromelas, (Hope, Bupr. p. 7).

Hab. Australia.

27. Stigmodera Hoffmanseggii, (Pl. III. fig. 3).

Hope, Tr. Ent. Soc. iv. 211.

"Violacea, thorace æneo, elytris purpurascentibus striatis, apice subserratis, humeris flavo-maculatis fasciisque duabus concoloribus ornatis; corpore infra chalybeo-violaceo, pedibusque æneis." (Hope).

Head, thorax, and antennæ bronzy green. Scutellum blue. Elytra bluish black, a square spot on the shoulder touching the margin, a somewhat oblique band above the middle sloping downwards towards the suture, and a third which widens out considerably at the margin, midway between it and the apex, reddish yellow. Underside of thorax and breast, green; abdomen cyaneous.

Head deeply punctured, excavated in front. Thorax nearly twice as broad at the base as long; anterior margin half as long as the base, slightly elevated and produced, the angles a little advancing forwards so as to embrace the head; sides diverging rapidly for two-thirds of their length, then straight to the posterior angles; disk slightly raised in front, very deeply punctured; near the posterior angle, on each side, and almost touching the lateral margin, is a slight oblong depression, in which the punctures are closer together. Elytra crenate, striate, three-quarters as long again as broad; sides sinuate below the shoulders, widest behind the middle, whence they converge to the apex, which is rounded. Underside and legs hairy, punctured.

Length 9 lines; breadth 4 lines.

Hab. Swan River.

28. Stigmodera Australasiæ, (Pl. III. fig. 4).

Stigmodera simulata, (Hope, Bupr. p. 3); *nec* L. & G.
Stigmodera Australasiæ, L. & G. ii. *Stig.* 32, pl. vii. fig. 35.

"Atra, thorace bronzeo, elytris nigro-violaceis flavo-trifasciatis, lateribus antice posticeque concoloribus. Corpus subtus æneum." (Hope).

Head and thorax bronzy black; antennæ brassy green. Elytra blue-black, with a spot on each touching the base, but reaching neither the suture nor the margin, a band situated about the middle and declining from the suture (which it does not quite touch) to the margin, and another near the apex, yellow; a small marginal spot of the same colour between the base and the median band. Underside dark violet, with greenish reflections; legs cyaneous.

Head deeply punctured, with a strongly impressed line between the eyes. Thorax half as broad again as long; anterior margin nearly straight, a little more than half as long as the base, angles produced; sides rounded, posterior angles acute; base slightly sinuate; disk deeply and closely punctured. Elytra punctate-striate, not quite twice as long as wide; sides sinuate below the shoulders; apex of each armed with a short central spine; posterior margin finely denticulate. Underside and legs punctured, covered with scattered white hairs.

Length $6\frac{1}{4}$ lines; breadth 3 lines.

Hab. Swan River.

29. Stigmodera simulata, (Pl. III. fig. 5).

L. & G. ii. *Stig.* 26, pl. v. fig. 27, (*nec* Hope).

Buprestis Helenæ, Hope, Tr. Ent. Soc. iv. 215.

"Nigro-ænea, thorace concolore, maculis quatuor irregularibus elytrorum; corpore subtus æneo, pedibus concoloribus." (Hope).

Head and thorax purplish black. Elytra yellow, the base black, and three very irregular black bands, arranged as follows:—a common diamond-shaped spot, starting from the scutellum and ending not quite one-third of the length of the elytra from the base; between this and the margin on either side are two longitudinal spots, the inner margins of which touch the points of the

diamond; these spots do not touch the lateral margins till just at their lowest extremities where they bend outward; united with the common spot on the suture, is a band reaching both margins, and between this and the apex is a spot shaped somewhat like the head of an anchor; this touches the apex, but not the posterior margins, and is connected along the suture with the band above it. Underside and legs bronzy.

Head deeply impressed between the eyes. Thorax not quite twice as broad as long; anterior margin straight, half as long as the base; sides much rounded in front, posterior angles acute; base very slightly sinuate; disk deeply punctured, with a faint smooth dorsal line. Elytra striate and deeply punctate, the punctures becoming larger and closer on the sides, three-quarters as long again as broad, sinuate below the shoulders; apex of each bidentate. Underside and legs punctured, thickly clothed with white hairs.

Length 6½ lines; breadth 3 lines.

Hab. Swan River.

30. Stigmodera Burchellii, (Pl. III. fig. 6).

L. & G. ii. *Stig.* 33, pl. vii. fig. 37, (*nec* Hope).

Buprestis perplexa, Hope, Tr. Ent. Soc. iv. 211.

Buprestis lanuginosa, Hope, Tr. Ent. Soc. iv. 215.

"Nigro-violacea, thorace cupreo, elytris maculis tribus aurantiacis, marginibus apicibusque sanguineis; corpore subtus æneo, lanugine albidâ obsito." (Hope).

Head and thorax green. Elytra yellow, the margins and apex red, and three green-blue bands, a straight one near the base widening slightly on the margin, the second behind the middle, and the third midway between it and the apex, limited on the sides by the red colour of the margins; the suture between the bands concolorous with them. Underside brassy green.

Head punctured, with a deeply impressed line between the eyes. Thorax three-quarters as broad again at the base as long; sides much rounded; base almost straight; disk deeply and rugosely punctured, with a faint smooth dorsal line (this character however appears to vary). Elytra three-quarters as long again as broad, punctate-striate; sides sinuate above the middle; apex bidentate. Underside and legs punctured, lanuginose.

Length 6½ lines; breadth 3 lines.

Hab. Swan River.

Perplexa, Hope, is merely a larger form of this species, with the colours less distinct.

31. Stigmodera Hopei, (Pl. III. fig. 7).

Stigmodera Burchellii, (Hope, Bupr. p. 3); *nec* L. & G.

"Olivacea, thorace viridi-æneo, elytris flavis, tribus fasciis nigro-violaceis. Corpus subtus æneum." (Hope).

Head and thorax bronzy-green. Elytra yellow, with three black bands, situate as in the preceding species, but their margins are concolorous. Underside bronzy-green, the four hindmost abdominal segments coppery.

Head punctured, deeply impressed between the eyes. Thorax not quite twice as broad at the base as long; anterior margin nearly straight and slightly raised, two-thirds as long as the base; sides rounded, posterior angles acute; base scarcely sinuate; disk punctured, with a faintly impressed dorsal line. Elytra punctate-striate, twice as long as wide; sides slightly sinuate below the shoulders; apex bidentate. Underside punctured, the sides of the abdomen with long hairs.

Length 5½ lines; breadth 2½ lines.

Hab. Swan River.

Allied to the preceding species, from which it is easily recognized by its flatter, longer, and more parallel form, as well as by its colour.

32. Stigmodera anchoralis, (Pl. III. fig. 8).

(Hope, Bupr. p. 5); L. & G. ii. *Stig.* 26, pl. v. fig. 26.

"Thorace viridi-æneo, elytris flavis, sutura maculis duabus humeralibus anchoræque figura, virescentibus. Corpore subtus æneo, albisque capillis obsito." (Hope).

Head and thorax bronzy-brown. Elytra flavous, with the following parts and markings greenish, namely, the base, a band situate about the middle, a smaller one connected with the former on the suture but touching neither margin, the suture between the median band and the base, and two elongate somewhat-curved spots

originating from the base, and extending along (but not touching) the lateral margins for about two-fifths of the entire length of the elytra. These markings, if the insect be turned head downwards, assume somewhat the shape of an anchor. Underside and legs bronzy.

Head punctured, impressed between the eyes. Thorax three-quarters as broad again as long; anterior margin straight, half as long as the base; sides rounded; base nearly straight; disk deeply and largely punctured; just above the posterior angle on each side is a small round impression. Elytra punctate-striate, twice as long as wide, the sides nearly straight till past the middle, whence they are rounded to the apex, which is armed with two strong external spines. Underside punctured, covered thickly with long white hairs; legs punctured.

Length 5½ lines; breadth 2 lines.

Hab. Swan River.

33. Stigmodera delectabilis, (Pl. III. fig. 9).

Hope, Tr. Ent. Soc. iv. 284.

"Viridis, thorace concolori, nitido et punctulato. Elytra striato-punctata, macula suturali majore viridi, altera minori utrinque posita, fascia lata auratoviridi, maculaque irregulari concolori apice terminata. Corpus infra læte viride, punctulatum, pedibus violaceis." (Hope).

Head, thorax, and scutellum green. Elytra red-yellow, with a diamond-shaped spot on the suture touching the scutellum, a somewhat triangular spot on each side between it and the lateral margin, a transverse band behind the middle touching the sides, and a sutural spot between it and the apex, golden-green; the apex also is very slightly tipped with the same colour. Underside bronzy-green.

Head punctured, deeply furrowed between the eyes. Thorax three-quarters as broad again at the base as long; anterior margin nearly straight, slightly elevated, half as long as the base; sides rounded; base shallowly lobed; disk rather flat, deeply punctured, the dorsal line indicated at the base by a large puncture; near the posterior angle on each side is a very small oblong fovea. Elytra punctured, deeply striate, not quite twice as long as wide; sides slightly sinuate below the shoulders; apex of each

bidentate. Underside and legs punctured, slightly hairy.

Length 6½ lines; breadth 2½ lines.

Hab. Port Philip.

34. Stigmodera iospilota, (Pl. III. fig. 10).

(Hope, Bupr. p. 6); *S. jospilota*, L. & G. ii. *Stig.* 35, pl. vii. fig. 39.

"Thorace viridi, elytris flavis, sutura, fascia, variisque maculis violaceis. Corpore infra virescenti." (Hope).

Head and thorax bronzy. Elytra red, the suture for about half its entire length widely margined with green, a vitta of the same colour on each side near the lateral margin, not quite reaching to the middle, and united to the suture at the base; about the middle the suture is met by a transverse green band touching the lateral margins, and below it by a much shorter one reaching about halfway across each elytron; the apex also is very slightly tipped with green. Underside bronzy-green.

Head punctured, channelled between the eyes. Thorax deeply punctured, widest at the base, two-thirds as broad again as long; anterior margin slightly elevated, emarginate, a little more than half as long as the base; sides rounded; base with a shallow lobe. Elytra punctate-striate, the interstices also punctured, two-thirds as long again as wide; sides sinuate above the middle; apex of each with a sharp central spine. Underside and legs punctured, with a grayish pubescence.

Length 4½ lines; breadth 1¾ lines.

Hab. Australia.

35. Stigmodera crenata.

Buprestis crenata, Don. Ins. N. Holl. *Bup.* pl. i. fig. 3.

Stigmodera crenata, (Hope, Bupr. p. 4); *nec* L. & G.

Hab. Australia.

The insect figured by Laporte and Gory under this name must be referred to the next species. The figure given by Donovan gives an idea of a very much narrower and lighter-coloured insect.

36. Stigmodera plagiata, (Pl. III. fig. 11).

Stigmodera bicruciata, (Hope, Bupr. p. 4).
Stigmodera crenata, L. & G. ii. *Stig.* 39, pl. ix. fig. 46 (*nec* Donov).
Stigmodera plagiata, L. & G. iii. 132 (*err. S. sexplagiata*), pl. xxiii. fig. 130.
Castiarina Hopei, Bohem. Eugen. Resa, Ins. p. 61.
Castiarina similata, Bohem. Eugen. Resa, Ins. p. 62.

"Thorace bronzeo, elytris sanguineis, sutura fasciisque tribus nigro-violaceis. Corpore subtus æneo albisque capillis obsito." (Hope).

Head and thorax dull bronzy. Elytra dull red, brighter near the lateral margins; the suture, and two broad bands, one just below the base, and the other near the middle, black; there is also a rather large black spot on the apex. Underside, legs, and antennæ, dull green.

Head deeply punctured, depressed, and furrowed between the eyes. Thorax half as broad again as long; anterior margin slightly produced at its angles, a little more than half as long as the base; sides much rounded, widest just behind the middle; posterior angles acute; base largely and shallowly lobed; disk convex in front, with an impressed dorsal line, deeply punctured, the puncturation rather closer on the sides. Elytra wider than the thorax at the shoulders, three-quarters as long again as wide; sides slightly sinuate above the middle; apex of each sub-bidentate; surface deeply punctured and striated, the interstices much raised and rounded, two on each elytron being rather more so than the rest; margins finely crenulate. Underside and legs punctured, densely clothed with short white hairs.

Length $4\frac{1}{2}$ lines; breadth 2 lines.

Hab. Sydney.

37. Stigmodera Andersoni, (Pl. III. fig. 12).

(Hope, Bupr. p. 5); L. & G. ii. *Stig.* 25, pl. v. fig. 25.

"Thorace bronzeo, elytris flavis, postice fascia nigro-violacea, macula magna apicali fasciæ conjuncta. Corpore subtus nigro-æneo, pedibus cyaneis." (Hope).

Head and thorax bronzy. Scutellum cyaneous. Elytra yellow, with a straight black band situate about a third of their entire length from the apex, which has a

square spot of the same colour united with the band along the suture. Underside cyaneous, legs bright blue.

Head punctured, excavated between the eyes. Thorax widest at the base, twice as broad as long, emarginate on the anterior margin, which is two-thirds the length of the base; sides very little rounded; base slightly sinuate; disk shining, punctured, the punctures becoming denser and larger on the sides; near each posterior angle is a slight rugose depression. Elytra punctate-striate, twice as long as broad; sides sinuate above the middle; apex truncate, armed with four spines, the outer ones the longest. Underside and legs punctured, hairy.

Length $6\frac{1}{4}$ lines; breadth $2\frac{1}{4}$ lines.

Hab. Australia.

38. Stigmodera phæorrhœa, (Pl. III. fig. 13).

Buprestis phœorhœa, Kirby, Tr. Linn. Soc. xii. 456, pl. xxiii. fig. 2.

Stigmodera phœorhea, (Hope, Bupr. p. 6).

This species seems to have been utterly ignored by Laporte and Gory in their Monograph.

39. Stigmodera vicina, (Pl. III. fig. 15).

(Hope, Bupr. p. 5.)

Stigmodera bicincta, (Hope, *l. c.*); L. & G. ii. *Stig.* 31, pl. vi. fig. 33 (*nec* Boisd).

"Thorace æneo, elytris bronzeo-violaceis, fasciis duabus flavis. Corpore infra æneo, pedibus atro-violaceis." (Hope).

Head and thorax bright coppery brown. Antennæ green. Elytra dark purple, each with a straight yellow band above the middle, and a sinuated one of the same colour near the apex. Underside purplish; legs cyaneous.

Head punctured, depressed between the eyes. Thorax twice as broad at the base as long; anterior margin half as long as the base; sides diverging almost to the posterior angles, which are acute; base sinuate; disk largely and deeply punctured. Elytra punctate-striate, interstices much raised, half as long again as broad; sides sinuate above the middle; apex of each truncate, and armed with

a short external spine. Underside and legs punctured, and slightly hairy.

Length 5 lines; breadth 2 lines.

Hab. Australia.

40. Stigmodera bicincta, (Pl. III. fig. 14).

Buprestis bicincta, Boisd. Voy. Astrol. ii. 89 (*nec* Hope).

Stigmodera bicincta, L. & G. iii. 131, pl. xxiii. fig. 129.

Stigmodera bicingulata, (Hope. Bupr. p. 5); L. & G. ii. *Stig.* 30, pl. vi. fig. 32.

Hab. Australia.

41. Stigmodera cyanicollis, (Pl. III. fig. 16).

Buprestis cyanicollis, Boisd. Voy. Astrol. ii. 91.

Stigmodera cyanicollis, L. & G. ii. *Stig.* 34, pl. vii. fig. 38.

Stigmodera subtrifasciata, (Hope, Bupr. p. 4); L. & G. ii. *Stig.* 41, pl. ix. fig. 48.

Stigmodera media, Hope, Tr. Ent. Soc. iv. 284.

Stigmodera rubrocincta, Gehin, Mem. Soc. Hist. Nat. Metz, 1855.

Hab. Adelaide.

42. Stigmodera cruentata, (Pl. III. fig. 17).

Buprestis cruentata, Kirby, Tr. Linn. Soc. xii. 455, pl. xxiii. fig. 1.

Stigmodera cruentata, (Hope, Bupr. p. 6); *nec* L. & G.

Hab. Australia.

It is strange how Laporte and Gory can have figured under this name an insect so totally different from Kirby's species, as a very good figure is given by him in the paper above quoted.

43. Stigmodera scalaris, (Pl. III. fig. 18).

Buprestis scalaris, Boisd. Voy. Astrol. ii. 89.

Stigmodera crucigera, (Hope, Bupr. p. 4); L. & G. ii. *Stig.* 40, pl. ix. fig. 47.

Hab. Hobart Town, &c.

44. Stigmodera vegeta, (Pl. III. fig. 19).

Hope, Tr. Ent. Soc. iv. 283.

"Læte cyanea, antennis concoloribus, thorace punctulato. Elytra violacea, fasciis tribus flavis fere ad suturam terminata; prima irregulari ad basin posita e humeris ad latera extensa, secunda latiori fere media, tertiaque minori. Corpus infra læte cyaneum, pedibus concoloribus." (Hope).

Head and thorax blue-green. Scutellum green. Elytra cyaneous, with three orange bands; the first at the base, the second above the middle, and the third near the apex, all interrupted at the suture. Underside, legs, and antennæ, cyaneous.

Head deeply punctured, excavated between the eyes. Thorax half as broad again at the base as long; anterior margin nearly straight, two-thirds the length of the base; sides rounded; base deeply sinuate; disk deeply and largely punctured, with a smooth irregular dorsal line, somewhat depressed at the base. Elytra punctate-striate, twice as long as wide; sides subparallel; apex of each with an external tooth. Underside and legs punctured, slightly hairy.

Length $4\frac{1}{4}$ lines; breadth 2 lines.

Hab. Adelaide.

45. Stigmodera amphichroa, (Pl. III. fig. 20).

Buprestis amphichroa, Boisd. Voy. Astrol. ii. 90.

Stigmodera 6-spilota, (Hope, Bupr. p. 4); L. & G. ii. *Stig.* 35, pl. viii. fig. 40.

Hab. Australia.

46. Stigmodera Sieboldi, (Pl. III. fig. 21).

(Hope, Bupr. p. 4); L. & G. ii. *Stig.* 38, pl. viii. fig. 44.

"Thorace elytrisque sanguineis, ternis fasciis violaceis, corpore infra viridi, nitido." (Hope).

Head golden green. Thorax dark green, with the sides of a more golden hue. Elytra bright red, with three straight broad cyaneous bands, one just below the base, the second about the middle, and the third at the apex; the first and third do not reach the lateral mar-

gins; the actual base of the elytra is tinged with brown. Underside, legs, and antennæ bright golden green.

Head punctured, with a wide shallow impression between the eyes. Thorax half as broad again as long; anterior margin nearly straight, a little more than half as long as the base; sides slightly rounded in front, almost straight behind; base with a shallow median lobe; disk punctured, with an impressed dorsal line, punctures on the sides much deeper. Elytra punctate-striate, a little more than twice as long as wide; sides subparallel; apex emarginate, the suture of each with a slight blunt spine. Underside, legs, and antennæ punctured.

Length 5 lines; breadth $1\frac{3}{4}$ lines.

Hab. King George's Sound.

47. Stigmodera Kirbyi, (Pl. III. fig. 22).

Buprestis Kirbyi, Guér. Voy. Coquille, p. 65.
Stigmodera Kirbyi, L. & G. ii. *Stig.* 33, pl. vii. fig. 36, (*nec S. Kirbii*, Hope).
Stigmodera vivida, (Hope, Bupr. p. 5).

Hab. Port Jackson, &c.

48. Stigmodera octospilota, (Pl. III. fig. 23).

L. & G. ii. *Stig.* 28, pl. vi. fig. 29.
Stigmodera femorata, L. & G. ii. *Stig.* 37, pl. viii. fig. 42.
Stigmodera Adelaidæ, Hope, Tr. Ent. Soc. iv. 212.

Hab. Adelaide.

49. Stigmodera decem-maculata, (Pl. III. fig. 24).

Buprestis 10-*maculata*, Kirby, Tr. Linn. Soc. xii. 456, pl. xxiii. fig. 3.
Stigmodera 10-*maculata*, (Hope, Bupr. p. 3); L. & G. ii. *Stig.* 36, pl. viii. fig. 41.

Hab. Australia.

50. Stigmodera picta, (Pl. III. fig. 25).

L. & G. ii. *Stig.* 46, pl. x. fig. 55.
Stigmodera purpurea, Hope, Tr. Ent. Soc. iv. 213.

Hab. Swan River.

51. Stigmodera assimilis, (Pl. III. fig. 26).

Hope, Tr. Ent. Soc. iv. 212.

"Violacea, thorace olivaceo-æneo, elytris tribus fasciis flavis; corpore infra purpurascente, pedibus concoloribus." (Hope).

Head green. Thorax green, the disk with a purplish tinge. Elytra purple-brown, marked as in *S. Australasiæ*, (*ante*, p. 37) except that the bands are rather wider. Underside of thorax dull cyaneous, abdomen dull green.

Head punctured, excavated between the eyes. Thorax half as broad again at the base as long, widest behind the middle; anterior margin nearly straight; sides much rounded, posterior angles acute; disk deeply and closely punctured. Elytra punctate-striate, twice as long as broad; sides rather strongly sinuate above the middle; apex of each with a short central spine. Underside and legs punctured, covered with white hairs.

Length 5½ lines; breadth 2 lines.

Hab. Port Philip.

This insect closely resembles *S. Australasiæ*, but the different shape of the thorax, the different ground colour and greater sinuation of the elytra, and the denser pubescence on the underside, seem sufficiently to distinguish it therefrom.

52. Stigmodera trifasciata, (Pl. III. fig. 27).

Stigmodera apicalis, (Hope, Bupr. p. 3); L. & G. ii. *Stig.* 43, pl. ix. fig. 51.

Stigmodera trifasciata, L. & G. ii. *Stig.* 38, pl. viii. fig. 43.

"Thoraceo olivace-æneo, elytris flavis, tribus fasciis apiceque cyaneis." (Hope).

Head and thorax bronzy green. Elytra flavous, with three wide bronzy-green bands, one below the base, the second at the middle, and the third covering the apex; all the bands unite on the suture, the one near the base does not quite reach the lateral margins. Underside and legs green.

Head deeply punctured, impressed between the eyes; on each side above the antennary cavity is a small round fovea. Thorax globose, not quite twice as broad as long; anterior margin half as long as the base, slightly raised, the centre and angles produced; sides much

rounded, posterior angles acute; base nearly straight; disk deeply punctured, with an impressed dorsal line, the punctures on the sides rather closer together. Elytra punctate-striate, twice as long as wide; sides subparallel for two-thirds of their length, thence converging to the apex, which is somewhat acuminate, the points slightly diverging. Underside and legs punctured.

Length $5\frac{1}{2}$ lines; breadth $2\frac{1}{4}$ lines.

Hab. Swan River.

53. Stigmodera spilota, (Pl. III. fig. 28).

(Hope, Bupr. p. 5); L. & G. ii. *Stig.* 24, pl. v. fig. 24.

"Ænea, thorace punctato viridi, elytris flavis, quatuor maculis nigro-æneis. Corpore infra viridi albidâque seritie aspersa." (Hope).

Head and thorax green. Elytra flavous, marked with seven bronzy-black spots—a common one on the suture, the centre of which is about a quarter of the entire length of the elytra from the base, a small one on each side near the margin slightly below the former, a large transverse one below the middle of each elytron, and a smaller round one between it and the apex. Underside and legs greenish blue.

Head deeply punctured, furrowed between the eyes. Thorax half as broad again as long; anterior margin straight, not quite two-thirds the length of the base; sides regularly rounded; base nearly straight; disk deeply punctured, the punctures thickening on the sides, the dorsal line indicated merely at the base, where there is a slight longitudinal impression, just above the scutellum. Elytra punctate-striate, twice as long as broad; sides straight for nearly two-thirds of their length; apex rounded. Underside and legs punctured, clothed with white pubescence.

Length $5\frac{1}{2}$ lines; breadth $2\frac{1}{4}$ lines.

Hab. Australia.

54. Stigmodera flavopicta, (Pl. III. fig. 29).

Buprestis flavopicta, Boisd. Voy. Astrol. ii. 92.

Stigmodera bicolor, L. & G. ii. *Stig.* 39, pl. viii. fig. 45.

Stigmodera colorata, Hope, Tr. Ent. Soc. iv. 283.

Hab. Adelaide.

55. Stigmodera xanthopilosa, (Pl. III. fig. 30).

Hope, Tr. Ent. Soc. iv. 283.

Stigmodera parallela, White, Proc. Zool. Soc. 1859, p. 119, pl. lix. fig. 3.

? Stigmodera splendida, Gehin, Mem. Soc. Hist. Nat. Metz, 1855.

"Affinis 10-*maculatæ*, at longior; elytris vix thorace latioribus; atro-violacea, thorace roseo-æneo et punctulato. Elytra flavo-marginata, striata, striis punctatis, maculis quatuor luteis, prima prope ad scutellum subrotundata, secunda fere oblonga, tertia parum transversa, ultima in apice minori. Corpus infra argentea lanugine obsitum; pedesque violacei." (Hope).

Dull black, with green and coppery reflections. Elytra with the lateral margin (not quite to the apex) and a discal row of four somewhat round nearly equidistant spots, flavous; the first spot touches the base, and the last is situated about a quarter of the entire length of the elytra from the apex. Underside and legs cyaneous, with coppery reflections, densely covered with silvery white hairs. Antennæ bronzy.

Head very deeply punctured, narrowly furrowed between the eyes. Thorax two-thirds as broad again as long, widest at the base; anterior margin nearly straight, slightly elevated, a little more than half as long as the base; sides rounded; base almost straight; disk deeply punctured, with a faint smooth dorsal line, and on each side of it above its centre is a small round smooth spot; near the posterior angles the punctures are larger and further apart. Elytra twice as long as broad; sides very slightly sinuate above the middle, whence they converge to the apex, which is rounded; disk punctate-striate, the interstices also punctured, puncturation of the sides very dense. Underside and legs punctured, covered with long silvery pubescence.

Length 7 lines; breadth 2 lines.

Hab. Adelaide.

56. Stigmodera consanguinea, (Pl. IV. fig. 1).

Stigmodera crocicolor, (Hope, Bupr. p. 6); *nec* L. & G.

"Thorace cupreo, elytris virescentibus, marginibus croceis, sex maculis concoloribus. Corpore subtus æneo albisque capillis obsito." (Hope).

Head coppery. Thorax green on the disk, the posterior angles coppery. Elytra golden-bronze, with coppery reflections, the lateral margins and three spots arranged in a longitudinal line on the disk of each, flavous; the first spot is long and narrow, and commences near the base, the second is somewhat triangular, the third is small, and situated about a quarter of the entire length of the elytra from the apex. Underside, legs, and antennæ, bronzy, densely covered with white hairs.

Head impressed between the eyes, punctured. Thorax widest about the middle, half as broad again at the base as long; anterior margin elevated, almost straight, two-thirds the length of the base; sides much rounded; base straight; disk very largely and deeply punctured, with a slight dorsal line met at the base by a large puncture; puncturation of the sides rather larger than that of the disk. Elytra twice and a quarter as long as broad, sides subparallel for three-quarters of their length; apex of each slightly rounded; disk punctate-striate, the interstices very finely punctured, the punctures closer together on the sides. Underside and legs punctured, covered with a dense long pubescence.

Length 4 lines; breadth 1½ lines.

Hab. Swan River.

57. Stigmodera Pertii, (Pl. IV. fig. 1 *a*).

(Hope, Bupr. p. 5); L. & G. ii. *Stig.* 23, pl. v. fig. 22.

"Præcedenti [*S. Andersoni*] affinis at major, capite inter oculos sulcato, thorace punctato miniato, antice macula viridi fere trigona, binisque aliis concoloribus postice positis; elytris striatis crebre punctulatis viridibus, fascia aurantia fere apicali ornatis. Corpore subtus miniato, segmentis abdominis utrinque maculatis, pedibus antennisque virescentibus." (Hope).

Head black. Thorax ochraceous, with a large transverse black spot above the middle, slightly emarginate on its anterior margin, and produced triangularly behind; there are also two small black spots on the base, one on each side of the scutellum. Elytra dull olive-green, with a transverse yellow band close to the apex. Underside flavous, the sides of the breast, a small round spot on the side of each abdominal segment, and the legs, greenish.

Head deeply punctured, channelled between the eyes. Thorax half as broad again at the base as long; anterior margin nearly straight, a little more than half the length of the base; sides very much rounded; base straight; disk largely punctured, with a slightly impressed dorsal line. Elytra twice as long as wide, punctured and finely striate; sides slightly sinuate below the shoulders; apex of each sub-bidentate. Underside and legs punctured, with a few short hairs.

Length 6½ lines; breadth 2½ lines.

Hab. Australia.

58. Stigmodera coccinata, (Pl. IV. fig. 2).

Conognatha coccinata, Hope, Tr. Ent. Soc. iv. 102.

"Coccinea, capite viride, antennisque concoloribus. Thorax læte miniatus punctatus, maculisque ternis viridibus insignitus, binis externis minutis, medioque majori fere rotundato. Elytra coccinea, tribus fasciis læte viridibus ornata, prima basale, duabus aliis fere apicalibus, viridi maculâ in singulo elytrorum inter basalem fasciam et apicales valde conspicuâ. Corpus infra sanguineum, pectore segmentisque abdominis utrinque viridi-maculatis, pedibus concoloribus." (Hope).

Head and antennæ cyaneous. Thorax sanguineous-red, the base green, a central oval spot and a small one on either side near the lateral margin, cyaneous. Elytra sanguineous, the base greenish-blue, the apex, a transverse oval spot about one-third of their entire length from the base, and a band constricted in the middle and situate midway between the spot and the apex, blue. Underside red, the breast and two spots on each abdominal segment at the sides blue; legs greenish.

Head deeply punctured. Thorax half as broad again at the base as long; anterior margin nearly straight, not quite three-quarters the length of the base; sides much rounded, widest just behind the middle; disk very largely and deeply punctured. Elytra almost twice as long as broad, sides sinuate below the shoulders, widest behind the middle; posterior margin slightly denticulate; apex armed with two sharp spines; surface deeply punctate-striate, interstices raised, smooth between the three first striæ, deeply and minutely punctured at the sides. Underside and legs punctured, and slightly hairy.

Length 5¼ lines; breadth 2 lines.

Hab. Adelaide.

59. Stigmodera Bremei, (Pl. IV. fig. 3).

Conognatha Bremei, Hope, Tr. Ent. Soc. iv. 102.

"Nigra, capite fere trigono æneo, medio fortiter impresso. Thorax bronzeus, marginibus externis subimpressis, disco punctatissimo, lineâ longitudinali medio vix impressâ, fovea utrinque fortiter insculpta. Elytra nigra, binis fasciis rubris, lateribus externis antice concoloribus. Corpus infra æneum et nitidum, pedibus concoloribus et punctatis." (Hope).

Purplish-black. Elytra with two red bands, one situate about a third, and the other about two-thirds of their length from the base; the apex, and the lateral margin, from the shoulder to the first band and from the second band to the apex, are also red. Underside, legs, and antennæ, bronzy.

Head deeply punctured, furrowed between the eyes. Thorax widest in front, half as broad again at the base as long; anterior margin slightly elevated, nearly straight, half the length of the base; sides much rounded above the middle, and then nearly parallel to the base, which has a large very shallow lobe; disk shining, deeply punctured; each side with two foveæ, placed close together, almost touching the margin, situate about midway between the anterior margin and the base, the posterior one rather the larger. Elytra widest about the middle, striate, the striæ finely punctate, not quite twice as long as wide; sides sinuate above the middle; apex of each simply pointed. Underside and legs deeply and closely punctured, with a few scattered white hairs.

Length 9 lines; breadth $3\frac{1}{2}$ lines.

Hab. Australia.

60. Stigmodera hilaris, (Pl. IV. fig. 4).

Hope, Tr. Ent. Soc. iv. 213.

"Æruginosa, elytris miniatis, humeris viridibus maculisque aliis concoloribus per discum positis, corpore infra læte virescenti." (Hope).

Head and thorax green. Elytra orange-red, with the suture, a diamond-shaped sutural spot commencing at the scutellum, a spot on each shoulder united to the last, a

band situate about the middle but not reaching the lateral margins, and a somewhat triangular spot below it, green. Underside green.

Head deeply punctured, furrowed between the eyes. Thorax widest behind the middle, half as broad again as long; anterior margin two-thirds the length of the base, slightly elevated, and almost straight; sides diverging till past the middle, then rounded and converging to the posterior angles, which are acute; base with a deep central lobe; disk slightly depressed in the dorsal region, largely and very closely punctured, the punctures so close together as to give the surface a dull appearance. Elytra widest at the shoulders, which are prominent, and much wider than the base of the thorax, twice as long as wide; sides sinuate above the middle; apex of each with a small external spine; disk punctate-striate, interstices finely and very closely punctured. Underside deeply and closely punctured, with a few scattered white hairs.

Length 3 lines; breadth 1 line.

Hab. Port Philip.

61. Stigmodera rufipennis, (Pl. IV. fig. 5).

Buprestis rufipennis, Kirby, Tr. Linn. Soc. xii. 456.
Stigmodera rufipennis, (Hope, Bupr. p. 6); L. & G. ii. *Stig.* 21, pl. iv. fig. 21.
Stigmodera crocipennis, (Hope, *l. c.*); L. & G. *l. c.* fig. 20, var.

Hab. Australia.

I cannot think that the suffusing of the black colour of the suture over the apex is sufficient to make *crocipennis* a distinct species from *rufipennis;* and I cannot perceive any other difference between them.

Gen. XYROSCELIS, (H. Deyr. MS.).

(Acmæodera, *pars,* Hope.)

1. Xyroscelis crocata, (Pl. IV. fig. 15).

Amorphosoma crocatum, L. & G. ii. *Am.* 13, pl. iii. fig. 16.
Acmæodera nodosa, Hope, Tr. Ent. Soc. iv. 217.
Acmæodera melanosticta, Hope, *ibid.*

Hab. Swan River.

Gen. CHRYSOBOTHRIS, Eschscholtz.

1. Chrysobothris Australasiæ, (Pl. IV. fig. 14).

Hope, Tr. Ent. Soc. iv. 216.

"Nigro-ænea, thorace pallidiori colore æneo, elytris nigricantibus, punctis duabus baseos fortiter impressis et alteris in medio cupreo-auratis; corpore subtus æneo, lateribus sublanuginosis." (Hope).

Head, thorax, and antennæ bronzy brown. Elytra darker, with two golden coppery spots on each, one just above, the other below the middle. Underside bronzy.

Head deeply and rugosely punctured. Thorax at the base twice as broad as long; anterior margin slightly rounded, only half the length of the base; sides widening from the anterior angles, with a slight emargination about the middle; posterior angles largely cut off and swollen; base deeply bisinuate; disk rugose transversely, with a slight indication of an impressed dorsal line. Elytra half as long again as broad; shoulders slightly prominent; sides almost straight till past the middle, whence they converge to the apex, which is rounded; the posterior margin is slightly denticulate; disk rugosely punctured, with four smooth raised lines on each, and two coppery impressions, one situate just above the middle on the second line, the other just below it on the third. Underside and legs deeply punctured; the sides of the abdomen slightly hairy, the apical segment with a central carina.

Length 6 lines; breadth $2\frac{1}{2}$ lines.

Hab. Swan River.

Gen. ETHON, Laporte and Gory.

(Diphucrania, *pars*, Hope.)

1. Ethon Roei, (Pl. IV. fig. 16).

Diphucrania Roei, (Hope, Bupr. p. 12).

"Capite inter oculos fortiter impresso, thorace aureo-tomentoso, elytris striato-punctatis purpurascentibus. Corpore subtus æneo albisque capillis obsito, antennis pedibusque æneis." (Hope).

Dull golden bronze; the posterior portion of the elytra of a brighter hue. Underside, the anterior margin of each abdominal segment with a whitish pubescence.

Head punctured, with a very deep longitudinal cut between the eyes; the sides of the forehead forming two carinæ bordering the eyes. Thorax half as broad again as long; anterior margin very slightly produced, a little more than half the length of the base; sides rounded; base bisinuate; surface punctured, vermiculate, and slightly tomentose; lateral carinæ short, straight, and strongly marked. Elytra two-fifths as long again as wide; sides subparallel as far as the middle; apex rounded; disk punctate, the punctures elongated and arranged in rows, the interstices finely punctured. Underside shining, vermiculate, the breast and the anterior margin of the abdominal segments slightly pubescent; legs punctured.

Length 5 lines; breadth 2 lines.

Hab. Australia.

2. Ethon subfasciatum, (Pl. IV. fig. 17).

Diphucrania subfasciata, (Hope, Bupr. p. 11).

"Ænea, capite inter oculos profunde impresso, thorace aureo-tomentoso, elytris integerrimis sericeis substriatis, ad apicem flaveolo tomento fasciatis. Corpore infra æneo et albo-tomentoso." (Hope).

Head and thorax dull bronzy. Elytra dark coppery brown, with numerous small spots and two transverse bands near the apex of a yellow pubescence. Underside and legs bronzy.

Head large, swollen, very deeply impressed between the eyes, punctured, and covered with yellow hairs. Thorax not quite twice as broad as long; anterior margin slightly emarginate, three-quarters the length of the base; sides diverging for a little more than half their length, then nearly parallel to the base, which has a rounded median lobe; disk with a scattered yellow pubescence, deeply punctured with elongate punctures having the appearance of short slits, which are arranged in semicircular curves. Elytra three-quarters as long again as wide; shoulders rather prominent; sides very slightly sinuate above the middle; apices rounded; surface regularly punctured in lines, the punctures like those on the thorax, and resembling short slits. Underside punctured, covered with silvery white hairs.

Length 4½ lines; breadth 2 lines.

Hab. Australia.

3. Ethon affine, (Pl. IV. fig. 18).

Diphucrania auriflua, (Hope, Bupr. p. 12).
Diphucrania purpurascens, (Hope, *l. c.*).
Ethon affine, L. & G. ii. *Eth.* 4, pl. i. fig. 5.
Ethon proximum, Boh. Eugen. Resa, Ins. p. 63.

"Præcedenti [*Diph. subfasciatæ*, Hope,] affinis. Capite inter oculos sulcato, thorace aurato subtomentoso, elytris roseocupreis et flavo-irroratis. Corpore subtus æneo albisque capillis obsito." (Hope).

Head and thorax coppery golden. Elytra of a redder hue, with two narrow golden pubescent bands; one, which is sinuated in its middle, situate about two-thirds of the length of the elytra from their base, touching the lateral margin but not the suture; the other very short, close to the apex; there are also a few small pubescent spots on the basal half of the elytra. Underside with a fine close gray pubescence, which is longer on the sides of the abdomen than elsewhere.

Head very deeply channelled between the eyes, pubescent, and punctured. Thorax twice as broad as long; anterior margin slightly produced in the centre and at the angles, two-thirds the length of the base; sides rounded; base with a rounded median lobe; disk pubescent, punctured, the punctures arranged in semicircles and becoming deeper on the sides. Elytra nearly twice as long as wide, punctate, the punctures arranged in longitudinal lines and assuming the form of short slits; sides sinuate above the middle; apex rounded. Underside and legs punctured and pubescent.

Length 4½ lines; breadth 2 lines.

Hab. Australia.

E. purpurascens differs in having the humeral impressions less strongly marked and the posterior angles of the thorax rather more rounded, as well as in the colour, which is purplish-red throughout; these differences however do not appear to me to be of specific value.

4. Ethon fissiceps, (Pl. IV. fig. 19).

Buprestis fissiceps, Kirby, Tr. Linn. Soc. xii. 458, pl. xxiii. fig. 4.
Diphucrania fissiceps, (Hope, Bupr. p. 12); *nec* L. & G.
Ethon viride, L. & G. ii. *Eth.* 6, pl. i. fig. 8.

Hab. Australia.

Gen. CISSEIS, Laporte and Gory.

(Diphucrania, *pars*, Ethon, *pars*, Buprestis, *pars*, Hope.)

1. Cisseis leucosticta, (Pl. IV. fig. 20).

Buprestis leucosticta, Kirby, Tr. Linn. Soc. xii. 382.
Diphucrania leucosticta, (Hope, Bupr. p. 11).
Ethon leucostictum, L. & G. ii. *Eth.* 2, pl. i. fig. 1.
Hab. Australia.

2. Cisseis signaticollis, (Pl. IV. fig. 21).

Ethon signaticolle, Hope, Tr. Ent. Soc. iv. 219.

"Affinis *E. bicolori*, Laporte, at longior. Violaceum, thorace aureo-nitido, binis albidis punctis notato, elytris violascentibus, punctis variis albis per discum aspersis." (Hope).

Head, thorax, and antennæ brassy; the thorax with two round white pubescent foveæ on the disk, and an oblong one on each side extending along the lateral margin. Elytra bluish-black, each with ten round white pubescent foveæ Underside cyaneous, with a white pubescent spot on each side of the breast and two on each abdominal segment.

Head largely and deeply punctured, depressed between the eyes, the depression filled with a whitish pubescence. Thorax three-quarters as broad again at the base as long; anterior margin rounded, two-thirds the length of the base; sides slightly rounded; base straight; disk very convex, very largely and deeply punctured, the punctures becoming closer together on the sides. Elytra twice as long as broad, sides straight, posterior margin denticulate, apex rounded, disk rugosely punctured. Underside and legs punctured, and slightly hairy.

Length 4½ lines; breadth 1½ lines.

Hab. Port Essington.

3. Cisseis 12-guttata, (Pl. IV. fig. 22).

Buprestis 12-*guttata*, Guér. Voy. Coquille, p. 65.
Cisseis 12-*guttata*, L. & G. ii. *Ciss.* 2, pl. i. fig. 1.
Diphucranai xanthosticta (Hope, Bupr. p. 11).
Cisseis 14-*notata*, Hope, Tr. Ent. Soc. iv. 218.
Hab. Port Jackson, &c.

4. Cisseis cupreicollis, (Pl. IV. fig. 23).

Ethon cupreicolle, Hope, Tr. Ent. Soc. iv. 219.

Ethon æneicolle, Hope, Tr. Ent. Soc. iv. 220, var.

"Nigro-æneum, thorace cupreo-aurato, binisque minutis foveis albis notatis, lateribus concoloribus; elytris atris et punctis duodecim albidis notatis; corpore infra viridi et nitido, segmentis abdominis utrinque albo-punctatis, pedibusque viridibus." (Hope).

Head and thorax golden bronze, the latter with a white pubescent spot on each side of the disk below its middle, and a similar one near the lateral margin. Elytra nearly black, with numerous round pubescent white spots, the principal of which are thus arranged on each elytron—one touching the base, three nearly touching the suture, and three near the lateral margin. Underside, the sides of the breast and of each abdominal segment with a white pubescent spot.

Head deeply punctured, channelled between the eyes. Thorax half as broad again as long; anterior margin produced, three-fifths the length of the base; sides slightly rounded; base bisinuate; surface deeply punctured and concentrically striated, with a round impression on each side of the disk, and another about half way up the lateral margin on either side; these foveæ are filled with a whitish pubescence. Elytra half as long again as broad, punctured and transversely ridged; sides nearly straight as far as the middle; apex rounded; posterior suture elevated. Underside transversely striated and punctured; legs punctured.

Var. *æneicolle*. Upper side entirely dark æneous black.

Length 2½ lines; breadth 1 line.

Hab. Adelaide and Moriatta.

5. Cisseis Gouldii, (Pl. IV. fig. 24).

Ethon Gouldii, Hope, Tr. Ent. Soc. iv. 220.

"Æneum, thorace cupreo-æneo, fortissime punctato, lateribus externe lineâ elevatâ æneâ conspicuis; elytris iridescentibus, æneis, colore violaceo sparsim aspersis, maculis duabus obscuris post scutellum positis; corpore infra æneo, punctato, pedibus concoloribus." (Hope).

Dull bronzy. Elytra with a cyaneous tint on the disk, and two obscure sutural spots, one near the base and the other just above the middle, covered with a grayish pubescence; just above the apex of each is a somewhat transverse gray pubescent band. Underside, the sides of the breast and of each abnominal segment with an obscure pubescent spot.

Head deeply punctured, swollen, furrowed between the eyes. Thorax three-fifths as broad again as long; anterior margin produced; sides rounded; base with a slight central lobe; disk deeply punctured and concentrically striated, lateral carinæ well marked and straight; base, especially near the posterior angles, depressed. Elytra twice as long as wide; apex largely rounded and finely denticulate; surface transversely rugose. Underside and legs punctured, transversely striate, with a few scattered hairs, besides the spots above mentioned.

Length 4 lines; breadth $1\frac{1}{4}$ lines.

Hab. Port Essington.

6. Cisseis similis, (Pl. IV. fig. 25).

Buprestis irrorata, (Hope, Bupr. p. 8); *nec* L. & G.

"Bronzea, capite æneo nitido, (tuberculo flavo in medio posito *), thorace marginato minutissime ruguloso, elytris subserrulatis albida sericie irroratis. Corpore infra cupreo nitido." (Hope).

Dull bronzy. Legs coppery. Elytra with numerous irregular gray pubescent spots, of which three are rather larger than the rest, two near the lateral margin, and one almost touching the suture near the apex.

Head flat in front, deeply punctured. Thorax three-quarters as broad again at the base as long; anterior margin two-thirds the length of the base, its angles quite enclosing the eyes; sides rounded; base with a small median lobe; disk punctured and striate in semicircular arcs. Elytra twice as long as broad; sides subparallel for two-thirds of their length; apex rounded; posterior margin finely denticulate; disk finely and rugosely punctured; each elytron with numerous gray pubescent spots, the chief of which are arranged as mentioned above. Underside and legs punctured, covered with a short fine gray pubescence.

Length $5\frac{1}{2}$ lines; breadth 2 lines.

Hab. Australia.

* The yellow tubercle mentioned by Mr. Hope is a small lump of extraneous matter which has adhered to the centre of the insect's head.

7. Cisseis suturalis, (Pl. IV. fig. 26).

Diphucrania suturalis, (Hope, Bupr. p. 12).

"Capite æneo, inter oculos profunde impresso, antice macula alba, postice binis aliis notato; thorace in medio æneo, marginibus cretaceis; elytris nigro-violaceis, sutura aurata fasciaque alba ante apicem ornatis. Corpore infra æneo, annulis abdominis cyaneis, lateribus albo-maculatis, antennis pedibusque æneis." (Hope).

Head and thorax æneous, with cyaneous reflections, the sides of the thorax covered with white pubescence, leaving two small round denuded spots on the anterior margin. Elytra cyaneous, the suture æneous, ornamented with white pubescence forming irregular transverse lines on their upper half, and a broad transverse band just above the apex. Underside cyaneous, the three apical segments with a small white pubescent spot on each side.

Head punctured, channelled in front, with a small round fovea near each eye just above the antennary cavity; a slight pubescent spot above the mouth and two on the vertex. Thorax twice as broad as long; anterior margin produced, its angles quite enclosing the eyes, not quite three-quarters the length of the base; sides much rounded; base slightly bisinuate; disk punctured, the punctures arranged in curves, sides pubescent. Elytra two-thirds as long again as wide, finely rugose and punctured; ornamented with a white pubescence; sides swelling out beyond the middle; apices rounded, posterior margins finely denticulate. Underside and legs punctured, covered with short adpressed hairs; the abdomen with two pubescent spots on each of its three apical segments.

Length $4\frac{1}{2}$ lines; breadth $1\frac{3}{4}$ lines.

Hab. Swan River.

8. Cisseis acuducta, (Pl. IV. fig. 27).

Diphucrania lata, (Hope, Bupr. p. 11).

Diphucrania ænea, (Hope, Bupr. p. 12).

Trachys acuducta, Kirby, Fauna Boreali-Americana, Ins. p. 162 (1837).

Cisseis marmorata, L. & G. ii. *Ciss.* 4, pl. i. fig. 5.

"Ænea, capite inter oculos subimpresso, thorace postice lobato, elytris crebrissime punctulatis integerrimis sericeis, foveolisque binis ad apicem parum distinctis. Corpore infra æneo alboque irrorato." (Hope).

Æneous; the sides of the thorax, portions of the elytra, and the underside, covered with a hoary pubescence.

Head punctured, depressed between the eyes. Thorax twice as broad as long; anterior margin a little more than half as long as the base, produced in the centre and at its angles, which quite enclose the eyes; sides slightly rounded; base with a rounded median lobe; surface punctured and striated in semicircular curves; sides covered with a gray pubescence. Elytra three-quarters as long again as wide; sides slightly swelling out behind the middle; apex rounded, posterior margin finely denticulate; disk finely rugose, with a scaly appearance, ornamented with a gray pubescence, leaving a spot surrounding the scutellum, a transverse band below the middle, and a patch on each posterior margin, denuded. Underside and legs punctured, covered with a white pubescence.

Length 5 lines; breadth $2\frac{1}{4}$ lines.

Hab. Australia.

I have examined Kirby's type-specimen, which is said to have come from Nova Scotia. I cannot but suspect some error of locality, since it seems to me scarcely possible that this undoubtedly Australian species should belong to the North-American fauna.

9. Cisseis roseocuprea, (Pl. IV. fig. 28).

Ethon roseocupreum, Hope, Tr. Ent. Soc. iv. 219.

"Totum corpus supra cupreum et punctatum, capite foveolato, elytris læte cupreis et iridescentibus. Corpus infra æneum, lateribus abdominis albido colore irroratis, pedibus concoloribus." (Hope).

Coppery red. Underside coppery bronze. Antennæ bronzy green.

Head deeply punctured, furrowed between the eyes. Thorax half as broad again as long; anterior margin much produced, three-quarters the length of the base; sides rounded; base slightly bisinuate; surface punctured and transversely ridged; disk elevated in front; base and sides near the posterior angles depressed; lateral carinæ very slightly curved, running almost parallel to the sides. Elytra finely rugose, three-quarters as long

again as wide; sides subparallel above the middle; apex rounded, extremely finely denticulated. Underside rugosely punctured, with a gray pubescent spot on each side of the breast and of the three posterior abdominal segments; legs punctured.

Length 3 lines; breadth $1\frac{1}{4}$ lines.

Hab. Moriatta.

Gen. AGRILUS, Mégerle.

1. Agrilus hypoleucus, (Pl. IV. fig. 29).

(Hope, Bupr. p. 13); L. & G. ii. *Ag.* 37, pl. viii. fig. 48.

Agrilus purpuratus, Hope, Tr. Ent. Soc. iv. 217.

Agrilus assimilis, Hope, *ibid.*

"Capite nigro-violaceo, fronte flavis capillis obsita; thorace violaceo, lateribus luteis; elytris purpurascentibus. Corpore infra cupreo, annulis abdominis albo maculatis." (Hope).

Brown-purple. Antennæ bronzy.

Head with a white pubescent spot above the mouth, produced upwards towards the forehead in the centre, and with a semicircular white spot between the eyes. Thorax with a spot on each side near the anterior angle, and the dorsal line, white. Elytra with the suture near the apex pubescent. Underside with the sides of the thorax and breast, and two spots, one on each side of the abdominal segments, covered with a whitish pubescence. The sides of the abdomen above bordering the elytra of the same colour.

Head deeply punctured, slightly furrowed in front. Thorax a quarter as broad again as long; anterior margin produced, about the same length as the base; sides almost straight; base slightly bisinuate; disk punctured, and transversely ridged, with an impressed dorsal line; sides near the anterior angles also impressed. Elytra three times as long as wide; sides slightly sinuate above the middle; apex finely denticulate; disk rugose, with a slightly raised longitudinal line on each elytron. Underside and legs punctured, covered with fine white hairs.

Length 4 lines; breadth 1 line.

Hab. Moriatta, West Australia.

2. Agrilus aurovittatus, (Pl. IV. fig. 30).

Hope, Tr. Ent. Soc. iv. 218.

"Affinis *Agrilo purpurato*, Hope, at minor. Purpurascens, capite aurato et punctato, thorace lineâ longitudinali mediâ aureâ, binisque aliis ad latera positis; elytris cupreo-purpureis, vittâ suturali auratâ in singulo conspicuâ, corpore infra æneo, pedibus concoloribus." (Hope).

Brown-purple. Head bronzy. Thorax with the dorsal line filled with a whitish pubescence. Elytra with the suture margined in the same manner. Underside, legs, and antennæ, golden bronze, covered with gray pubescence.

Head swollen, channelled on the vertex, punctured, and transversely ridged, with two smooth transverse raised spaces. Thorax a quarter as broad again as long; anterior margin about the same length as the base, rounded; sides nearly straight; base bisinuate; disk punctured and transversely ridged, with a deep dorsal furrow; sides also impressed above the lateral carinæ, which are arcuate posteriorly. Elytra nearly three times as long as wide; sides slightly sinuate above the middle; apex somewhat pointed and very finely denticulate; suture finely rugose, sutural region depressed and gray-pubescent. Underside and legs punctured and pubescent.

Length $2\frac{3}{4}$ lines; breadth $\frac{3}{4}$ line.

Hab. Moriatta.

Gen. PARACEPHALA, (H. Deyr. MS.).

(Agrilus, *pars*, Hope.)

1. Paracephala pistacina, (Pl. IV. fig. 31).

Agrilus pistacinus, Hope, Tr. Ent. Soc. iv. 218.

"Totum corpus supra et infra viride punctatum, antennis saturatiore colore inquinatis. Caput fere rotundatum; thorace angulis posticis rectè acutis; elytra ænea, creberrime punctulata. Corpus infra viride, sericie albida obsitum, pedibus concoloribus." (Hope).

Dull bronzy-green; cylindrical.

Head swollen, punctured, with a few long white hairs. Thorax widest in front, one quarter as broad

again as long; anterior margin rounded, as long as the base; sides nearly straight; base bisinuate; surface punctured, slightly hairy, with a shallow impression stretching right across the thorax. Elytra twice and a quarter as long as wide, finely rugose, covered with short silvery white hairs; posterior suture elevated; sides subparallel; apex rounded and denticulate. Underside and legs punctured, covered with short white hairs.

Length 2 lines; breadth ½ line.

Hab. Adelaide.

Species ignotæ.

I am unable to recognize any of the five following species:—

1. Buprestis subcyanea.

(Hope, Bupr. p. 8.)

I have searched carefully in Mr. Hope's collection, and in the British Museum, but cannot find any trace of this species. It was probably a *Melobasis*.

2. Anthaxia affinis.

(Hope, Bupr. p. 10.)

The type of this is apparently lost. It was probably a *Melobasis*.

3. Diphucrania abdominalis.

(Hope, Bupr. p. 11.)

The type of this also is not to be found. It was probably a *Cisseis*.

4. Stigmodera tricolor.

Buprestis tricolor, Kirby, Tr. Linn. Soc. xii. 455.

Stigmodera tricolor, (Hope, Bupr. p. 6).

"I am doubtful if this species belongs to the genus *Stigmodera*, never having seen it." (Hope).

I have sought in vain for the type of this species. Kirby's description might apply to many of the *Stigmoderæ*.

5. Buprestis lapidosa.

MacLeay, in King's Austr. App. p. 11; (Hope, Bupr. p. 9).

"This species is unknown to me; it appears somewhat allied to the foregoing insect" [*Buprestis irrorata*]. (Hope.) This is unknown to me also; perhaps it was a *Melobasis*.

Explanation of the Plates.

Plate I.

Fig. 1. *Cyria imperialis*, Fabr., *ante*, p. 3.
2. ,, ,, var. *australis*.
3. ,, *vittigera*, L. & G., p. 3.
4. *Diodoxus scalaris*, L. & G., p. 4.
5. ,, *erythrurus*, White, p. 4.
6. *Chrysodema gigas*, Hope, p. 5.
7. *Chalcotænia albivittis*, Hope, p. 6.
8. ,, *Lamberti*, L. & G., p. 7.
9. *Cyphogastra farinosa*, Fabr., p. 7.
10. *Nascio xanthura*, L. & G., p. 8.
11. ,, *Parryi*, Hope, p. 9.
12. *Asthræus Samouelli*, E. Saund., p. 10.
13. *Euryspilus chalcodes*, L. & G., p. 11.
14. *Melobasis pyritosa*, Hope, p. 13.
15. ,, *gloriosa*, L. & G., p. 14.
15*a*. ,, *superba*, L. & G., p. 14.
16. ,, *cupriceps*, Kirby, p. 15.
17. ,, *propinqua*, L. & G., p. 15.
18. ,, *metallifera*, E. Saund., p. 16.
19. ,, *verna*, Hope, p. 17.
20. ,, *Lathami*, L. & G., p. 17.
21. ,, *nervosa*, Boisd., p. 18.
22. *Plagiope chrysochloris*, L. & G., p. 12.
23. ,, *cuprifera*, Kirby, p. 13.
24. *Castalia bimaculata*, Oliv., p. 22.
25. *Stigmodera macularia*, Don., p. 23.
26. ,, *Gorii*, L. & G., p. 23.
27. ,, *sanguinosa*, Hope, p. 24.

Plate II.

Fig. 1. *Stigmodera cancellata*, Don., *ante*, p. 25.
2. ,, *Roei*, E. Saund., p. 24.
3. ,, *gratiosa*, Chevr., p. 25.
4. ,, *Parryi*, Hope, p. 25.
5. ,, *flavocincta*, L. & G., p. 26.
6. ,, *grandis*, Don., p. 26.
7. ,, *limbata*, Don., p. 27.
8. ,, *suturalis*, Don., p. 27.
9. ,, *Fortnumi*, Hope, p. 27.
10. ,, *Mitchellii*, Hope, p. 28.
11. ,, *variabilis*, Don., p. 28.
12. ,, ,, var. *nigripennis*.

Fig. 13. *Stigmodera sanguinipennis*, L. & G., *ante*, p. 29.
14. ,, *hæmatica*, Hope, p. 29.
15. ,, *Spencii*, L. & G., p. 30.
16. ,, *signaticollis*, Hope, p. 30.
17. ,, *cyanura*, Hope, p. 31.
18. ,, *Yarrellii*, L. & G., p. 32.
19. ,, *semicincta*, L. & G., p. 33.
20. ,, *undulata*, Don., p. 34.
21. ,, *cruenta*, L. & G., p. 34.
22. ,, *Klugii*, L. & G., p. 34.

PLATE III.

Fig. 1. *Stigmodera amabilis*, L. & G., *ante*, p. 35.
2. ,, *Erythromelas*, Boisd., p. 36.
3. ,, *Hoffmanseggii*, Hope, p. 36.
4. ,, *Australasiæ*, L. &. G., p. 37.
5. ,, *simulata*, L. & G., p. 37.
6. ,, *Burchellii*, L. & G., p. 38.
7. ,, *Hopei*, E. Saund., p. 39.
8. ,, *anchoralis*, L. & G., p. 39.
9. ,, *delectabilis*, Hope, p. 40.
10. ,, *iospilota*, L. & G., p. 41.
11. ,, *plagiata*, L. & G., p. 42.
12. ,, *Andersoni*, L. & G., p. 42.
13. ,, *phœorrhœa*, Kirby, p. 43.
14. ,, *bicincta*, Boisd., p. 44.
15. ,, *vicina*, E. Saund., p. 43.
16. ,, *cyanicollis*, Boisd., p. 44.
17. ,, *cruentata*, Kirby, p. 44.
18. ,, *scalaris*, Boisd., p. 44.
19. ,, *vegeta*, Hope, p. 45.
20. ,, *amplichroa*, Boisd., p. 45.
21. ,, *Sieboldi*, L. & G., p. 45.
22. ,, *Kirbyi*, Guér., p. 46.
23. ,, *octospilota*, L. & G., p. 46.
24. ,, *decem-maculata*, Kirby, p. 46.
25. ,, *picta*, L. & G., p. 46.
26. ,, *assimilis*, Hope, p. 47.
27. ,, *trifasciata*, L. & G., p. 47.
28. ,, *spilota*, L. & G., p. 48.
29. ,, *flavopicta*, Boisd., p. 48.
30. ,, *xanthopilosa*, Hope, p. 49.

PLATE IV.

Fig. 1. *Stigmodera consanguinea*, E. Saund., *ante*, p. 49.
1*a*. ,, *Pertii*, L. & G., p. 50.
2. ,, *coccinata*, Hope, p. 51.
3. ,, *Bremei*, Hope, p. 52.
4. ,, *hilaris*, Hope, p. 52.
5. ,, *rufipennis*, Kirby, p. 53.

Fig. 6. *Prospheres aurantiopicta*, L. & G., *ante*, p. 7.
7. *Curis caloptera*, Boisd., p. 21.
8. ,, *aurifera*, L. & G., p. 21.
9. *Calodema regalis*, L. & G., p. 22.
10. *Neocuris Fortnumi*, Hope, p. 19.
11. ,, *Guerinii*, Hope, p. 20.
12. *Anilara Adelaidæ*, Hope, p. 19.
13. *Merimna atrata*, L. & G., p. 18.
14. *Chrysobothris Australasiæ*, Hope, p. 54.
15. *Xyroscelis crocata*, L. & G., p. 53.
16. *Ethon Roei*, E. Saund., p. 54.
17. ,, *subfasciatum*, E. Saund., p. 55.
18. ,, *affine*, L. & G., p. 56.
19. ,, *fissiceps*, Kirby, p. 56.
20. *Cisseis leucosticta*, Kirby, p. 57.
21. ,, *signaticollis*, Hope, p. 57.
22. ,, *duodecimguttata*, Guér., p. 57.
23. ,, *cupreicollis*, Hope, p. 58.
24. ,, *Gouldii*, Hope, p. 58.
25. ,, *similis*, E. Saund., p. 59.
26. ,, *suturalis*, E. Saund., p. 60.
27. ,, *acuducta*, Kirby, p. 60.
28. ,, *roseocuprea*, Hope, p. 61.
29. *Agrilus hypoleucus*, L. & G., p. 62.
30. ,, *aurovittatus*, Hope, p. 63.
31. *Paracephala pistacina*, Hope, p. 63.
32. *Cinyra spilota*, Hope, p. 11.

II. *On some undescribed Species of South-African Butterflies, including a New Genus of* Lycænidæ.

By Roland Trimen.

[Read 2nd December, 1867.]

Since the completion of my published Catalogue of South-African Butterflies, many species have been added to the list of those known to inhabit the Southern extra-tropical regions of the African continent; and among these I have been so fortunate as to meet with examples of eighteen species which appear to be undescribed. Half of the entire number is composed of species belonging to the family *Lycænidæ*, and one of these is a butterfly presenting such remarkable characters, that I am led to regard it as the type of a new genus, and have so described it, under the name of *Deloneura immaculata*.

The other nine novelties consist of two species of *Papilio* of great interest, an *Acræa*, a species of *Panopea* (family *Nymphalidæ*), and five *Hesperiidæ* belonging to the genera *Pyrgus*, *Cyclopides*, and *Pamphila*.

In treating of these hitherto undescribed insects, I have not confined myself to descriptions only, but have given all the particulars which I have been able to collect, concerning their habits and haunts, a kind of information with which we are in general very scantily supplied, but of which the Entomological Society will recognize the importance.

It is gradually becoming acknowledged that the accurate description of genera and species, highly important and indeed indispensable as it is, is not the sole end and object of Entomology, any more than of other kindred branches of Natural Science. The scientific definition of the peculiar characters of a species is, in fact, only the starting-point from which we can safely and surely proceed to investigate its relations, not only to its own near allies and immediate conditions of life, but also to other groups of organic beings, actors like itself in that great drama of Nature which, with not unfrequent shifting of scenes and change of performers, has been enacting from the remote dawn of life, and is yet in progress.

Family PAPILIONIDÆ.

Genus Papilio, Linn.

1. *Papilio Euphranor,* (Pl. V. fig. 1, 2).

Exp. 4 in.—4 in. 3 lin.

Hind-wings tailed. *Brownish-black, with pale sulphur-yellow band, and marginal spots.*

♂. *Fore-wing:* costa finely irrorated with yellow as far as extremity of discoidal cell, where the irrorations are so dense as to form a more or less distinct longitudinal streak; this streak with a more conspicuous one immediately below it, being the origin of a transverse band of eight well-defined elongate spots, gradually enlarging to a little beyond middle of inner margin; this band is rather abruptly angulated on first discoidal nervure, where the second spot is connected with the last of a short row of three smaller spots (in line with the six other spots of transverse band) from costa near apex; in cell, at lower edge of its extremity, a small rounded yellow spot (sometimes wanting). *Hind-wing:* macular band of fore-wing continued by a belt of the same colour (nearly straight on its inner edge, but outwardly sharply denticulated with black on the crossing nervures) which terminates narrowly on inner margin beyond middle; adjoining belt, but separated from it by a black bar on disco-cellular nervules, a curved row of three spots, of which the uppermost is largest; immediately beyond inner-marginal extremity of belt, but sometimes touching it, a small sub-lunular *orange* spot; a sub-marginal row of 11-12 spots arranged in pairs between nervules, the spots of the fourth and fifth pairs usually confluent; tail black, not spotted, rather broad, slightly spatulate. In *both wings,* the indentations of hind-marginal edge between nervules are marked with yellow lunules.

Underside.—General pattern similar to that of upperside; hind-wing and apical region of fore-wing *warm chocolate-brown, clouded with paler grayish-ochreous-brown* (which has, in many parts, a faint violaceous lustre). *Fore-wing:* upper spots of transverse band, and those of row from near apex, represented by ill-defined yellowish-white marks; cellular spot larger and more distinct, and succeeded by an additional spot just beyond cell; other spots of band as above, but each emitting a small, acute,

central projection towards hind-margin. *Hind-wing:* basal region unclouded by paler brown; an indistinct, longitudinal, bifurcate, black streak in cell; transverse belt almost white, *narrower* than above, especially in its central portion; the adjacent spots, just beyond cell, smaller, nearly white; sub-marginal spots obsolete, or but very faintly indicated; orange spot wanting, or represented by a few scales.

♀. Ground-colour not so dark; yellow markings duller, broader. *Fore-wing:* apical *row of spots prolonged to sub-median nervure by five additional spots,* the first of which is confluent with third spot of transverse band. *Hind-wing:* before sub-marginal spots, *a row* (*continuous of that in fore-wing*) *of yellowish lunulate spots* between nervules, terminating in a conspicuous orange lunule (much larger than in ♂); yellow indentation of margin beyond this lunule sometimes tinged with orange. Underside.—*Fore-wing:* most of sub-marginal spots well-marked. *Hind-wing:* inner row of spots partially represented, the orange lunule distinct.

P. Euphranor should be placed in that section of the genus of which *P. Hesperus,* Westw.,* has hitherto been the solitary representative. It differs but very slightly in structure, the costa of the fore-wings being rather less arched than in *P. Hesperus,* and the apical region not quite so much produced; while the tails of the hind-wings are much broader at the base and less spatulate. *P. Euphranor* is a much smaller species; and its upper-side markings present more general resemblance to those of *P. Thersander,* Fab., and allies, than to those of *P. Hesperus.* The colouring of the underside is, however, very similar in *Hesperus* and *Euphranor,* particularly in the hind-wings, where the transverse white bands and extra-cellular spots (the *latter* not present on *upper-side* in *Hesperus*) are almost identical in form and position. A smaller, but not unimportant sign of affinity is also found on the underside of the hind-wings of both species, consisting in a peculiar arrangement of the scales, which gives the greater portion of the surface a *very fine transversely-ribbed* appearance, not observed in any other African species of *Papilio. Euphranor* is easily to be distinguished from the *Thersander* group by the unspotted, uniform blackness of its tails.

* Arcana Entomologica, i. p. 189, pl. 48. (A species inhabiting the Gold Coast, Western Africa).

This fine *Papilio* was discovered by Mr. J. H. Bowker, at the end of the year 1865, near the River Tsomo, a tributary of the Kei, in Kaffraria Proper. The species occurred in abundance at the "Boolo Forest," about the end of November, and again in February; its flight being described as "like that of *P. Menestheus*, but higher, and often extended from the forest to the open."*

A living specimen of the pupa was forwarded to me at Capetown, but the perfect insect unfortunately emerged on the journey, and remained undeveloped. Mr. Bowker described its colouring as "bright green beneath, and pale green, with light spots, on the upper side," and noted its resemblance to that of *Papilio Demoleus*. This resemblance must, however, be one of colouring only, for the form of the chrysalis differs widely, the base of the abdomen being very much wider and flatter than in the *Demoleus* pupa, while the thoracic projection is much more rounded and less prominent, and the head has two small, acute, outward projections, instead of being deeply bifid. In these respects it more resembles the chrysalis of *Papilio Nireus*, but the peculiarities are more strikingly developed than in that species.

In the Collections of the South-African Museum, A. R. Wallace, and R. Trimen.

2. *Papilio Echerioides*, (Pl. VI. fig. 1, 2).

Exp. 2 in. 9 lin.—3 in. 8 lin.

Allied to *P. Cynorta*, Fab.

♂. *Black, with a yellowish-white band, macular in fore-wing, broad and entire in hind-wing;* a row of spots of the same colour on hind-margin of hind-wing. *Fore-wing:* band commencing near apex, and consisting of eight distinct spots, separated by woolly-black bars or nervures, and gradually increasing in width and length from the 1st and irregularly-ovate spot between 4th and 5th sub-costal nervules to inner-margin beyond middle; on edge of hind-margin, just below apex, the fringe is rather conspicuously white; the other indentations of margin being very faintly marked with whitish cilia. *Hind-wing:* band occupying all central region, but rather before than beyond middle, its

* I saw several examples of this butterfly, or of a closely allied form, in a forest at Tunjumbili, on the Tugela frontier of Natal, early in March, 1867. Their flight was limited to a small open, across which they continually passed at a considerable height, often settling on the lofty trees on either side.

inner edge well defined, nearly straight, its outer edge invading the ground colour and slightly radiating on the nervures, but at the same time pierced to a little depth by black internervular rays; immediately adjoining the white internervular marks of cilia, but sometimes distinctly separated from them, a row of six conspicuous more or less rounded spots, of which the first two are smaller than the rest. UNDERSIDE.—Apical region of fore-wing, and hind-marginal half of hind-wing, *dark-brown*. *Fore-wing:* second spot of band very faintly marked, and, as well as first spot, confused with some *grayish-white clouding* from apex; sub-costal nervure whitish for some distance from base. *Hind-wing:* space between base and inner edge of band *warm brownish-ochreous*, with the crossing nervures, an ovate and an elongate spot between costal and sub-costal nervures, a 3-branched longitudinal streak in cell, and a streak on each side of sub-median nervure, *black;* a small *white* spot at origin of median and sub-median nervures; pale band very much narrower than on upper side, its outer half (except on costa) being obscured with *pale-brownish*, and further pierced by internervular rays, and marked with two brownish striæ in cell; hind-marginal spots smaller than above, each divided by a black internervular ray; between extremity of cell and hind-margin, immediately above discoidal nervule, *an ovate whitish spot*.

♀. Strikingly different from ♂, and closely resembling *Danais Echeria*, Stoll.

Fore-wing: in discoidal cell, not far from extremity, and adjoining sub-costal nervure, an oblique white mark, of variable size and shape; beyond cell, a short, oblique, white bar, crossed by 1st discoidal nervule; a large, ovate, white spot just below cell, between 2nd and 3rd median nervules (its upper edge sometimes extending over 2nd median); a conspicuous spot below apex touching white mark on cilia, and a sub-marginal row of four other similar white spots, between 1st discoidal nervule and sub-median nervure. *Hind-wing:* central band *pale ochreous yellow* (occasionally dull whitish yellow), broader, its inner edge being nearer base, but so greatly narrowed on costa and—to a less extent—on inner-margin, that it assumes the form of an externally-rounded patch; marginal spots *white*, larger than in ♂, the lower ones not so close to the hind-margin, occasionally a small additional one at anal angle. UNDERSIDE.—Much as in ♂, with the exception of the very different white markings of fore-

wing, which agree with those of the upperside. *Fore-wing:* 1st spot of row of four wanting; all other spots rather larger. *Hind-wing:* basal ochreous narrower than in ♂; two or three central spots of marginal row always more or less obliterated; spot between cell and hind-margin always present, occasionally large and irregular in shape.

An unusually small ♀ specimen in my collection has all the pale markings ochreous-yellow instead of white.*

As regards the ♂ sex, *P. Echerioides* presents many marks of distinction from its nearest ally, *P. Cynorta*, Fab. (*Zeryntius*, Boisd.), of which the following may be noticed, viz. 1°, the band of *fore-wing* is much narrower than in *Cynorta*, its inner edge being at some distance from discoidal cell, and its outer edge much further from hind-margin; 2°, this band is continuous, and gradually widening from its origin, while in *Cynorta*, it is abruptly interrupted, the 2nd spot being absent or nearly obsolete, and the 3rd very large; 3°, the outer edge of the band is slightly concave instead of convex, and the composing spots are narrower and less blunt internally, the black separating rays being broader; 4°, in the *hind-wing*, the band is usually narrower than in *Cynorta*, its inner edge being further from base, while its outer edge is almost even, instead of being sharply and regularly dentated by the internervular rays; 5°, the conspicuous hind-marginal spots are wholly wanting in *Cynorta*.† On the underside, 6°, the inner edge of the band of *fore-wing* is rather further from the discoidal cell than it is on the upperside, while in *Cynorta* it is so close as partly to touch the extremity of the cell; 7°, a small whitish discocellular spot is sometimes found in *Cynorta*, but there is no trace of it in *Echerioides;* 8°, in the *hind-wing*, the basal ochreous is darker and redder, extending further along costa, and the outermost of its two black spots is more elongate; 9°, the band is considerably narrower, the inner edge not so even, the brownish clouding of its outer border more defined; 10°, the internervular rays are not so strongly marked; 11°, the spot between cell and hind-margin is not found in *Cynorta*. As a rule, *Echerioides* is considerably larger than *Cynorta*.

With reference to the ♀, I may mention that there is no room for doubt as to the specific identity of the two

* A similar variation of colouring is not uncommon in *Danais Echeria*.

† Prof. Westwood (Arc. Ent. pl. 40, f. 3, 4) figures an example in which these spots, though very small, are present.

sexes described above, Mr. Bowker having repeatedly observed them *in copulâ*, and having forwarded to me two pairs captured by him in that condition. A well-established case of this description affords us something like reliable grounds for reconciling other so-called "distinct species," and resolving them into the differing sexes of one insect. Every year's discoveries prove to us that arbitrary entomological decrees of divorce are far more numerous in our collections than we had any idea of. The determination, beyond dispute, of the ♀ *Echerioides* has led me to search for the same sex of *P. Cynorta*, there being only ♂s of the latter in the National and other collections. I have found, it is true, nothing resembling the ♀ *Echerioides;* but, placed next to *P. Cynorta*, in most arrangements, is the *P. Boisduvallianus* of Westwood, an insect only differing from *Cynorta* in the arrangement of the white markings of the anterior wings, —the very character by which the ♀ *Echerioides* seems, at first sight, so remote from the ♂. *Boisduvallianus* most accurately imitates the colouring and pattern of *Acræa Gea*, Fab. (♀), another West-African butterfly; —how closely may be inferred from the fact that associated with three specimens of the *Papilio* in the British Museum I found an example of the *Acræa !*—but the resemblance is scarcely more remarkable than that existing between the ♀ of *P. Echerioides* and *Danais Echeria*.

Both the perfect examples of *Papilio Boisduvallianus* in the National Collection are ♀s; the third wants the abdomen, but all its characters coincide with those of the two others; and the only example in Mr. Swanzy's collection (from the Gold Coast) is of the same sex. All the four specimens of *P. Cynorta* in the British Museum, as well as others in the Hope Museum, and in the collections of Mr. Salvin and Mr. Hewitson, are ♂s. I am convinced after careful comparison, and from analogy with the case of *Echerioides*, that *P. Boisduvallianus* is the ♀ of *Cynorta*; and should this be eventually proved, a better distinction between the two species, the ♂s of which are so nearly alike as those of *Cynorta* and *Echerioides*, could not be wished for, than the fact of one ♀ wearing the livery of an *Acræa* and the other that of a *Danais*.*

* The point in which the ♀ *Echerioides* most differs from *Danais Echeria*, and most resembles as well as its own ♂ as *P. Cynorta* and *P. Boisduvallianus*, is in the basal colouring of the underside of the hind-wings, which is almost identical in all the four.

The first specimen of this species that I received was taken by Archdeacon Kitton, of King William's Town, in the Perie Bush, a mountain forest some miles from the town, in April, 1863. This example, a ♂, reached me in a very damaged state, and I erroneously considered it to be *P. Messalina*, Stoll, and so recorded it in my "Rhopalocera Africæ Australis," pt. ii. p. 329. Mr. J. H. Bowker subsequently forwarded a number of specimens of both sexes, from the Sogana and Boolo forests, near the river Tsomo, in Kaffraria. His notes on the species are very graphic and interesting, and I gladly append the more important of them. In February, 1865, he found the ♂ "numerous at one spot in the forest, where the large yellow-wood trees had been cut away; they kept flying in one regular track, more regular than that of any other *Papilio* that I have seen on the wing." During the next month, he notes the flight as "low, seldom above the weeds and undergrowth, and rarely extending beyond the 'bush.'" In November, both sexes made their appearance "in great numbers, but disappeared in four weeks' time." In January, 1866, a "fresh brood" came out, and the species was "the most common butterfly at the Boolo," and remained on the wing during February. "The ♂ takes a constant course through the forest, returning regularly by the same route; while the ♀ keeps about the place, but flying at a lower elevation, and does not appear to take the rounds of the ♂. The sexes disappeared together at the end of November, and did not appear again until early in January, when they both came out on the same day. . . . The two pairs I send were taken *in copulâ*. The ♂ and ♀ meet, whirl about amongst the tops of plants in the forest, and, as soon as united, disappear down under the leaves, and have to be hunted up without the net."

I took both sexes of this species, on the 8th of March, 1867, in woods at Tunjumbili, on the Tugela frontier of Natal. The ♂s were tolerably numerous, but I only saw two ♀s, and, at the first glance, mistook one of them for *P. Cenea*, Stoll,* which is still more closely imitative of

* There is good ground for considering *Papilio Cenea* to be the ♀ of *P. Merope*, Cram. No ♂ *Papilio* with the colouration of *Cenea* is known to exist, while all the specimens of *Merope* are ♂s; and the colouring of the body, the position of the apical spot of the fore-wings, and the markings of the hind-wings (chiefly on the under-surface) are so much alike in the two forms as to support the belief that they are sexes of the same species, apart from the collateral evidence of *habitat*, &c. I propose to treat of

Danais Echeria. The flight of the insects quite confirmed Mr. Bowker's description, the ♂s coursing pretty rapidly and irregularly over the underwood, while the ♀s hovered flutteringly near the ground, and often settled on leaves.

In the Collections of the South-African Museum, A. R. Wallace, and R. Trimen.

Family ACRÆIDÆ.

Genus Acræa, Fab.

Acræa Anacreon, (Pl. VI. fig. 3, 4, 5).

Exp. 1 in. 10 lin.—2 in. 7 lin.

♂. *Fulvous-ochreous; each wing with a discal transverse row of black spots, and a black hind-marginal border marked with spots of the ground colour.*

Fore-wing: a conspicuous rounded black spot in discoidal cell, near extremity; another spot, narrower and more oblique, on disco-cellular nervules; seven spots in irregular discal row, of which the 5th and 6th are largest, the first (near costa) usually indistinct, and the 7th (on inner margin beyond middle) frequently wanting; costa edged with black, which widens into a broad apical border containing seven spots of the ground-colour; this border gradually narrows to a thin edging at anal angle, its inner edge radiating on the nervures, but leaving the last two spots confluent with the ground-colour; between summit of discal row and marginal border often some indistinct yellowish-white scaling; base clouded with black, widest on inner margin. *Hind-wing:* no black spot on disco-cellular nervule, but one in cell, near extremity; another spot before middle, between costal and sub-costal nervures; seven spots in irregular discal row, of which the last two are largest; black hind-marginal border moderately broad, diminishing slightly towards anal angle, more or less radiating inwardly on nervures, and enclosing eight sub-lunulate spots rather paler than the ground-colour, or (sometimes) whitish-yellow; basal black rather deeply piercing cell, and extending broadly

this and some similar cases more fully in another paper; but it is right to note here that the ♀ of what is generally regarded as a Madagascarene variety of *Merope* (viz. *P. Meriones*, Felder), does not widely differ from the ♂.

below median nervure to rather beyond origin of 3rd nervule; inner margin beyond middle tinged with whitish-yellow in those specimens in which the marginal spots are of that hue. UNDERSIDE.—*Hind-wing*, and costal border and apical region of *fore-wing, whitish-yellow;* the extremities of all the nervures strongly defined with black. *Fore-wing:* spots as above; more or less conspicuous fulvous internervular rays from hind-margin stripe the yellow of apical region. *Hind-wing:* spots as above, but larger, those of discal row often touching; below median nervure a black transverse stripe of three contiguous spots extends to inner margin, and almost touches the 8th and last spot of discal row; base marked with two rather large, black-edged *pink* spots; immediately before discal spots a row of *pink marks*, indistinct or obsolete near costa, but large and conspicuous towards inner margin; spots of hind-marginal border whitish-yellow, and so much larger than above as to reduce the black to a narrow edging; before these spots are very faint internervular fulvous rays. In *both wings*, the basal black is wanting, but the costa is marked with a small, distinct, black spot close to base.

♀. *Semi-transparent grayish-ochreous; an indistinct, dusky-whitish, costal bar* outwardly bordering first three spots of discal row; black of hind-marginal borders duller, rather broader. *Fore-wing:* an additional, elongate spot, before middle, just below median nervure. *Hind-wing:* a minute spot usually marking the 1st disco-cellular nervule. UNDERSIDE.—Yellowish colouring paler; internervular rays obsolete, or nearly so; pink markings of hind-wing duller, especially those on disk, which are sometimes wanting.

A ♂ specimen, taken in Kaffraria by Mr. Bowker, has the whitish-yellow costal scaling developed into a distinct whitish bar like that of the ♀; and there is a similar, but much smaller whitish marking on costa of hind-wing.*

This *Acræa* is very distinct from all the described species. It is intermediate between *A. Rahira*, Boisd. (its nearest ally) and *A. serena*, Fab. Besides the bright fulvous colouring of the ♂, and the greater transparency of the ♀, *Anacreon* may easily be distinguished from

* It is remarkable that some examples of this *Acræa* have the wings much more elongated than those of the majority; and in these the spots and markings are more attenuated. This peculiarity is observable in both sexes.

Rahira by its possession of a *maculated hind-marginal border*. This character is presented by *A. serena*, but the small size of that species and its want of any discal spots in the fore-wings preclude the possibility of confounding *Anacreon* with it.

In April, 1865, two ♂ specimens, taken on the banks of a small river called the Sogana, were received by me from Mr. Bowker, and these Kaffrarian examples were the only ones I had seen until March, 1867, when I found the species pretty commonly in the Umvoti District of Natal, particularly near Greytown and about the Noodsberg. Like *A. Rahira*, the butterfly delights in damp, reedy spots, and has a very weak, low flight. It frequently settles on flowers, and the ♀s may easily be taken with the fingers. I met with *Rahira* in the same region, and often in the same spots, but it was not more abundant than *Anacreon*.

In the Collections of the South-African Museum, and R. Trimen.

Family NYMPHALIDÆ.

Genus Panopea, Hübn. *

Panopea Tarquinia, (Pl. V. fig. 3).

Exp. 2 in. 11 lin.—3 in.

♂. *Brownish-black, with white and yellowish-white bands. Fore-wing:* an outwardly convex band of four white spots, of which the 1st (smallest) is in discoidal cell close to its extremity, and the 4th (largest) between 2nd and 3rd median nervules; two wide, elongate, yellowish-white spots, one on each side of sub-median nervure, form an irregular patch on inner margin rather beyond middle; two obliquely-lying sub-quadrate white spots between white band and apex, one on each side of 1st discoidal nervule; a very narrow line of pure-white edges costa from a little beyond middle, ending *at apex* in a conspicuous white spot extending to the cilia immediately adjoining. *Hind-wing:* a broad yellowish-white band, continuous of inner-marginal patch of fore-wing, occupies middle; its inner edge not far from base, slightly crene-

* Verz. Bek. Schmett. p. 39. A genus allied to *Diadema*, but distinguished by its much longer, very gradually-clavate *antennæ;* shorter, more convergent *palpi*, with much shorter terminal joint; and by the strongly inward-curved nervule closing discoidal cell of *fore-wing*, which joins the median nervure exactly at the origin of the 2nd median nervule. These characters approximate *Panopea* to *Romalæosoma*.

lated,—its outer edge regularly and sharply dentated by internervular black rays from hind-margin. In *both wings* indistinct traces of a sub-marginal row of dull-whitish spots; cilia with white internervular dots.

Underside.—*Ground-colour pale ochreous-brown* except brownish-black discal region of fore-wing. *Fore-wing:* a small white spot at origin of sub-costal and median nervures; a fulvous-ochreous streak along costa for some distance from base; a black longitudinal ray in cell, confluent with discal black; white band and spots larger than above, especially spot at apex, which is widely suffused inwardly; a third spot, very much smaller than the other two, at lower end of bar between band and apex; four or five small white spots in a sub-marginal row between 1st median nervule and anal angle. *Hind-wing:* base, as far as inner edge of band, *dull fulvous-ochreous*, with eight black spots, viz. one on costa at base, one on each side of pre-costal nervure, three in cell, and one on each side of 1st sub-costal nervule; four of these mark the edge of central band, which is broader than above; a sub-marginal row of small white spots in pairs between nervules; internervular rays more conspicuous than above.

♀ Unknown.

This species is closely allied to *P. Lucretia*, Cram., but as far as the ♂ sex is concerned, presents the following differences, viz. in *fore-wing*—1°, the white bar of two spots is square, and does not radiate towards hind-margin; 2°, the inner-marginal patch is yellowish-white, and does not extend to 3rd median nervule; 3°, the white costal edging and apical spot are not found in *Lucretia;* while in *hind-wing*,—4°, the band is *yellowish*-white, and much broader, extending nearer to base. On the underside in *fore-wing*, 5°, *Tarquinia* wants both the whitish scaling in cell, and the conspicuous white radiation from sub-apical bar; 6°, the median band is wider; 7°, the sub-marginal white spots are smaller and fewer; while in *hind-wing*—8°, the basal ochreous is broader; 9°, the sub-marginal spots much smaller; and 10°, the inter-nervular streaks fainter. The white lateral stripe and spots of the abdomen are smaller and yellower than in *Lucretia*.

This butterfly bears a very remarkable resemblance to *Acræa Aganice*, Hewits.,* the shape and position of the

* The West-African *Lucretia*, with its much more conspicuous sub-apical white marking, bears a strong likeness to *Acræa Lycoa*, Godt., a native of the same region.

central bands, the colouring, and particularly the basal markings of the underside of hind-wing, being singularly similar; but the *Panopea* has a short sub-apical white bar not found in the *Acræa*. The latter marking is, however, not noticeable in flight; and I fully believed the first example that I met with to be *Acræa Aganice*, (which was common in the same wood), until it settled on the damp pathway immediately before me. I searched in vain for a second specimen on that day, as well as on many subsequent occasions in the woods near Port Natal; but, on the 24th February, 1867, on the edge of a forest near the village of Verulam, about twenty miles northward of D'Urban, I met with another individual. This example exactly imitated, not only the slow floating flight of *Acræa Aganice*, but also its invariable habit of settling occasionally, with closely-shut *dependent* wings, on the projecting twigs of the outermost trees on the edge of the wood. There is reason to believe that the species is rare, as the daily forest-hunting of myself and my Kafir collector for several weeks never resulted in the capture of another example; nor have I seen one in any collection, either from Natal or the adjoining South-African regions.*

In the Collection of R. Trimen.

Family LYCÆNIDÆ.

Genus Deloneura, n. g.†

Head wide, flattened anteriorly, clothed with scales superiorly: *eyes* prominent, smooth; *palpi* naked, ascendant, widely divergent, the second joint much swollen, the terminal joint slender, acute, rather short; *antennæ* of moderate length, stout, very gradually incrassated, the extremity slightly curved outwards. *Thorax* short, stout, smooth and with scattered scaling anteriorly, thinly hairy posteriorly. *Wings* large, broad, the hind-margins very convex. *Fore-wings* with costa strongly arched from base to middle, thence nearly straight; apex well defined, anal angle smoothly rounded off; inner-margin convex

* Since this paper was read, I have seen two examples in the Collection of Mr. Hewitson; one, from the Zambesi, being similar to the two specimens here described, the other, from Natal, larger and with yellowish bands.

† From δῆλος and νεῦρον.

near base; costal nervure short, not extending to middle; sub-costal with five branches, of which four end on costal edge, and the 5th on hind-margin immediately below apex; two discoidal nervules dissociated from the sub-costals, and having a common origin at upper part of extremity of discoidal cell; the cell itself short, blunt, closed by a straight slender nervule. *Hind-wings* almost ovate; costa gently arched; inner-margins enveloping underside of abdomen at base, and thence gradually divergent; costal nervure short, but ending a little beyond middle; discoidal nervule separated from sub-costals at its origin by a short disco-cellular nervule; discoidal cell short, blunt, its straight closing nervule meeting the 1st and 2nd medians at their common origin. *Legs* very stout, smooth, without hairs; the femur and tibia of each about equal in length; tarsi of front pair perfectly developed, 5-jointed, the ungues distinct.* *Abdomen* rather short and thick, compressed laterally, arched in the centre, enlarged posteriorly.

I was for some time in much doubt as to the relations of this peculiar genus, but having, at the suggestion of Mr. A. G. Butler, of the British Museum, carefully compared it with the American genus *Eumenia*, Blanch. (*Eumæus*, Hübn.), I feel satisfied that its proper position will be with that group of butterflies. Apart from the strong mark of affinity in the distinctly-closed wing-cells, there is great similarity in the general structure and proportions of the body, and especially in the characters of the legs. Differences amply warranting the generic distinctness of *Deloneura* are, however, plainly observable. In the latter the antennæ are curved, instead of straight and rigid as in *Eumenia;* the palpi considerably shorter, more ascendant and divergent, the terminal joint more slender, the middle joint much swollen: in the *fore-wing* there are five sub-costal nervules, instead of only three, while the discoidal nervules have a common origin, in place of being widely separated as in *Eumenia;* and in the *hind-wing*, the closing nervule of cell meets the 1st and 2nd median nervules at their

* I regret that paucity of examples of the species on which this genus is founded (of the three individuals before me two are the property of the South-African Museum) prevents me from actually ascertaining by dissection whether the fore tarsi are identical in both sexes; but, judging from the external characters of the abdomen, the much larger size, and the more rounded wings of one specimen, I believe it to be a female, while the other two have the aspect of males. The fore tarsi are precisely similar in these three specimens.

common origin, while in *Eumenia* it is oblique, and only meets the 1st median some way from its origin.

The plain ochreous colouring of the type of *Deloneura* is strikingly different from the rich dark hues of *Eumenia*.

Deloneura immaculata, (Pl. V. fig. 4).

Exp. 1 in. 5 lin.—1 in. 9 lin.

Yellow-ochreous, without spot or marking of any description.

Underside.—Hind-wing, and costal and hind-marginal region of fore-wing *slightly paler*.

Thorax, head, palpi, antennæ, and legs *dull-black;* the antennæ tipped, and the back of thorax scaled with *ochreous;* abdomen *ochreous* beneath, ochreous mixed with blackish above.

Hab. Bashee River, Kaffraria.

Entomology is indebted to Mr. J. H. Bowker for the discovery of this remarkable butterfly, which took place at the end of December, 1863. In some letters addressed to me about that time, Mr. Bowker notes the species as "a true forest insect, only found in or at the edge of woods, and appearing but for a few days. In flight they resemble *Acræa Horta*, and still more the *yellow tree-moth*,* whirling slowly, with flapping wings, round the tops of trees, rising and falling, sailing away and returning." † The species would seem to be extremely local, Mr. Bowker not having met with it elsewhere than on the Bashee River, though constantly collecting in many other parts of Kaffraria in which he has been stationed.

In the Collections of the South-African Museum and R. Trimen.

Genus Zeritis, Boisd.

1. *Zeritis Sardonyx*, (Pl. V. fig. 5; Pl. VI. fig. 6, 7).

Exp. 1 in. 8 lin.—2 in. 1 lin.

♂. *Orange-fulvous* (not metallic), *with brownish-black*

* Mr. Bowker here alludes, I believe, to a species of *Aroa* (a genus of Liparideous Bombycina allied to *Orgyia*) which abounds in the wooded regions of South Africa,—*A. crocata*, Walker.

† Mr. Salvin informs me that he has observed *Eumeniæ* on the wing in Central America, and that their flight, with the exception of being lower, is not unlike that here described.

markings and hind-marginal borders. Fore-wing: base with a blackish suffusion; costa bordered with creamy- or vinous-ochreous from base to a little before middle, thence with brownish-black to apex; hind-marginal border broad, of tolerably even width to anal angle, where it is considerably enlarged; a slightly-irregular, macular, transverse band extends from costal border to join hind-marginal border on 3rd median nervule; a small rounded black spot in discoidal cell; marking extremity of cell a larger, squarer spot, confluent with costal border. *Hind-wing:* a shining, pale grayish-ochreous space at base, adjoining costa; lower basal region with blackish suffusion; apical region occupied broadly with brownish-black, which parts to form a hind-marginal edging disappearing before attaining sub-median nervure, and a broader discal ray ending rather abruptly on 3rd median nervule; inner-margin whitish; anal-angular lobe and caudal projection vinous-ochreous. *Cilia* of both wings conspicuously varied with black and white.

Underside.—*Hind-wing, and margins of fore-wing, varying from dull vinous- to dark ferruginous-ochreous. Fore-wing:* the following *silvery-white* black-ringed spots, viz. two cellular, and a band of six beyond middle (representing the markings of upperside); and an additional spot in cell near base; orange ground-colour paler than above. *Hind-wing:* two conspicuous pure-white, short, transverse streaks, at a little distance apart, between costal and sub-costal nervures, about middle; beyond middle, a similar, much longer, slightly-irregular streak extending from 1st sub-costal nervule to inner-margin; adjoining the latter streak a grayish inner-marginal space, extending narrowly along margin—outwardly to lobe at anal angle, and inwardly as far as a small narrow white mark. *Cilia* of the ground-colour, varied with whitish.

♀. *Considerably larger, paler,* markings similar. *Fore-wing:* hind-marginal border comparatively narrower, the space of ground-colour between it and transverse band broader. *Hind-wing:* black from apical region not so extended, only the commencement of the discal ray being present, and ending on 1st median nervule, and the hind-marginal edging being narrower. Underside. —Quite as in ♂.

A much-injured specimen of the ♀, in the South-African Museum, has the discal markings obscure and much reduced in size, especially the macular band of

fore-wing, which ends on 2nd median nervule, without meeting hind-marginal border.

This very distinct *Zeritis* has no close ally known to science. In general structure, outline of wings, and character of the upperside markings, it is nearer to *Z. Perion*, Cram., than to any other; but, besides its much greater size, and paler colour, it has no trace of the brilliant gilded spots of that species, but pure-white streaks on the underside of the hind-wings; while the remarkably long and porrected palpi are widely different from those of *Perion*, and approximate the insect to *Z. malagrida*, Wallengren, and allies.

Z. Sardonyx inhabits the north-eastern portion of the Cape Colony. In November, 1864, two specimens were forwarded to me for identification, respectively by Mr. J. J. Muskett, M.R.C.S., of Murraysburg, and Mr. D. Kannemeyer, junior, of Burghersdorp. I have subsequently received four fine examples from Mr. Muskett, who captured them "only in the neighbourhood of a particular bush on a hill-side near Murraysburg."

In the Collections of the British Museum,* the South-African Museum, and R. Trimen.

2. *Zeritis Chrysantas*, (Pl. V. fig. 6).

Exp. 1 in. 2 lin.

Sub-metallic pale-orange, with black spots and narrow hind-marginal borders; cilia broad, conspicuously varied with black and white. Fore-wing: an elongate black spot marking extremity of discoidal cell; an irregular discal row of five small spots, of which the 3rd and 5th are beyond the line of the other three, extending from close to costa to 3rd median nervule; base narrowly grayish; on costa, beyond middle, three minute, oblique, white lines, separated by black; a rounded whitish spot at apex, touching white cilia; hind-marginal border broadest at apex, narrowing to anal angle, its inner edge dentated with orange on median nervules. *Hind-wing:* base narrowly grayish; no discal spots; hind-marginal border broadest near costa, its inner edge irregularly dentate with orange on nervules.

Underside.—*Hind-wing, costal edge and apical and hind-marginal border of fore-wing, pale grayish-ochreous, varied with whitish. Fore-wing:* orange paler; an addi-

* A ♀ specimen, presented by Mr. Kannemeyer.

tional, sub-marginal row of six black spots, of which the upper three are filled with glittering-brassy; 1st spot of transverse row, two small additional spots on costa, spot closing cell, and two additional spots in cell, also marked with dense glittering-brassy scaling; an additional blackish spot before middle, just below median nervure; an indistinct hind-marginal row of small whitish lunules, commencing with that at apex. *Hind-wing:* the following glittering-brassy, brownish-edged spots, viz. three in cell—1st (minute) at base, the 2nd (larger) midway, the 3rd (large) at extremity; two near base—one just below costal, the other just below median nervule; nine forming a regular sub-marginal row—the 3rd and 4th conspicuously clouded with dark-brown; a discal, rather irregular row of nine whitish-gray spots, of which the 1st, 2nd, 8th and 9th are more or less marked with brassy scales; several quadrate whitish marks interspersed between the brassy spots; hind-marginal lunules as in fore-wing, that next anal angle largest, inwardly edged with dark brown.

The only specimen I have seen is, I believe, a ♀, but the abdomen having unfortunately been devoured by insects on the voyage to England, I cannot be certain as to the sex. The species is allied to *Z. Zeuxo*, Linn., but is readily distinguished both from that species and from *Z. Chrysaor*, mihi, by *the hind-wings being spotless above, and metallic-spotted beneath*, as well as by the broad, chequered cilia.

This beautiful *Zeritis* formed one of an interesting collection made by Mr. and Mrs. Muskett, at Murraysburg, and kindly presented to me by them in July, 1864.

In the Collection of R. Trimen.

3. *Zeritis Lyncurium.*

Exp. 1 in.—1 in. 1½ lin.

♂. *Metallic golden-red, with narrow hind-marginal black borders. Fore-wing:* base slightly blackish; costa narrowly black to beyond middle, where the edging widens to join hind-marginal black border, which is broadest at apex, and the inner edge of which is irregularly dentated with red on median nervules; a narrow black spot at extremity of cell; sometimes an indistinct smaller spot in cell; usually from one to four small spots indicative of a discal transverse row. *Hind-wing:* base and costa

clouded with blackish, sometimes very broadly; occasionally a faint narrow mark at end of cell; hind-marginal black border very sharply dentated with red on median nervules. UNDERSIDE.—*Hind-wing, and costal and upper hind-marginal border of fore-wing, pale-brownish- or ferruginous-ochreous. Fore-wing:* discal row distinct, irregular, of six spots, extending to sub-median; an additional sub-marginal row of five or six minute spots; below median nervure, a blackish suffusion from base, and a black spot; spot closing cell, two spots in cell, two minute costal spots, 1st spot of discal row, and first three spots of sub-marginal row, more or less marked with glittering-steely scales. *Hind-wing:* the following inconspicuous darker markings, here and there edged inwardly with dull-metallic scales, viz., a narrow marking closing cell; a spot in cell; two elongate spots between costal and sub-costal nervures, before middle; and an irregular discal row; along hind-margin, indications of some paler lunulate markings. Cilia dull-gray, varied with blackish.

♀. *Rather larger, paler. Hind-wing:* costal clouding narrower, not so dark; red indentations of marginal border deeper, almost reaching hind-marginal edge. UNDERSIDE.—Spots better marked; but the steely scaling much duller and fainter, and wholly wanting in some spots.

Nearly allied to *Z. Chrysaor*, mihi, but differing in its smaller size, darker colour, broader hind-marginal borders, the imperfection of discal row of spots in fore-wing, and its entire absence in hind-wing, and particularly in the *broad costal black clouding of hind-wing*, no trace of which is found in *Chrysaor;* while, on the underside, the discal band of fore-wing is less irregular, and inclines inwardly instead of towards anal angle,—the sub-marginal spots are more distinct,—and the steely markings of the spots are fewer and much less brilliant; and the markings of hind-wing are more glistening and defined.

This *Zeritis* was discovered by Mr. J. H. Bowker, near the River Tsomo, in December, 1864. In that month and the following one, he captured a good many specimens, but only in two spots, "flitting about stunted bushes growing between rocks, upon a lofty hill-ridge." *Z. Chrysaor* inhabits the same parts of Kaffraria, but has a wide range from Cape Town to Natal.

In the Collections of the South-African Museum and R. Trimen.

Genus Aphnæus, Hübn.

Aphnœus Caffer.

Aphnæus Natalensis, *Hewits. Illustr. Diurn. Lep.*, II. pl. xxv. fig. 1, 2, (nec *Doubl.*).

Exp. 1 in.—1 in. 4 lin.

Closely allied to *A. Natalensis*, Doubl.

♂. Blue, paler, not so violaceous as in *Natalensis*. *Fore-wing: three conspicuous, transverse ochreous-yellow stripes*, all commencing a little below costa,—the 1st short, crossing cell,—the other two long, beyond middle, usually narrowly confluent on second median nervule. *Hind-wing:* anal-angular orange brighter and wider, the metallic central dot marking it smaller. Underside.—All the golden-striped, black-edged transverse bands, filled with *orange-ochreous*, instead of dull-purple. *Fore-wing:* no spot on costa at base, or at origin of inner sub-marginal streak. *Hind-wing:* base and inner margin rather widely orange-ochreous; transverse band beyond middle inclining *outward* rather than inward, its extremity always joining inner sub-marginal streak, which is orange throughout, instead of dull-purplish.

♀. Similar to ♂; cellular band of fore-wing obscured with blue; the outer bands broader, more widely confluent at lower extremity. Underside.—Quite like that of ♂.

Cilia in both sexes pale orange-ochreous instead of dull-grayish.

The differences above noted are so constant in a long series of specimens, that I consider it impossible any longer to regard the two forms as specifically identical, although, when I had seen but one example (from Sierra Leone) of *A. Caffer*, I regarded it as a variety of *Natalensis*.* *A. Caffer* is smaller than *Natalensis*, and approaches nearer to *A. Vulcanus*, Fab., particularly in the underside markings of the hind-wings.

Accompanying the distinction of colours and markings is a difference of *habitat* and haunts. The true *Natalensis* is a forest butterfly, and I never met with it away from the low coast region of Natal; while *Caffer* inhabits the upland grassy hills of the interior of the Colony. Both species are swift and active flyers, but settle frequently, *Natalensis* preferring the leaves and flowers of tall shrubs, and *Caffer* those of low plants among the grass.

In the Collections of the British Museum, the South-African Museum, W. C. Hewitson, and R. Trimen.

* See "Rhopalocera Africæ Australis," ii. p. 228.

Genus LYCÆNA, Fab.

1. *Lycæna Barberæ*, (Pl. V. fig. 7).

Exp. 6-8 lin.

Dark-brown: cilia broad, white, interrupted with brown at ends of nervures. Hind-wing: a very indistinct hind-marginal row of blackish dots. Underside.—*Brownish-gray* (the hind-wing irrorated with *whitish*); each wing with a brownish incompletely white-ringed spot at end of cell; a rather irregular discal row of similar confluent spots; and a double sub-marginal row of white lunules. *Hind-wing:* along hind-marginal edge, and inwardly bounded by double row of white lunules, *a row of black, brilliantly golden-dotted spots*, of which the 3rd, 4th, 5th, and 6th are large and conspicuous; a golden mark (without black) at anal angle; two round, dark-brown, white-ringed spots near base, one above, the other below cell.

The sexes appear to be alike, excepting for the rather larger size of the ♀. The discoidal cell is remarkably short in both fore and hind-wings, its termination being considerably before the middle.

The nearest allies to this minute species with which I am acquainted are two *Lycænæ* in the British Museum; one from Ceylon, labelled "*L. Chinga*," the other from California, and named "*L. exilis*;" but I am not aware that either of these has been described. *L. Barberæ* differs from both in its *broader, blunter wings, dark-brown colour above, and broad white cilia interrupted with brown.* The Californian species presents the peculiar character of a strong sub-metallic reddish gloss on the outer half of the fore-wing beneath; and, above, the wings have a bluish suffusion at the bases.

I have named this *Lycæna*, which may fairly dispute with the Californian species the distinction of being the smallest of known butterflies, in honour of Mrs. F. W. Barber, of Highlands, near Grahamstown, who has rendered important services to South-African Entomology. The first examples of the insect that I received were taken by Mrs. Barber and Mr. H. J. Atherstone in the neighbourhood of Highlands. I have since received specimens from the Tsomo River, from Burghersdorp, and from Murraysburg, respectively captured by Mr. Bowker, Mr. Kannemeyer, and Mr. Muskett; so that the insect would appear to be widely distributed in the eastern portion of the Cape Colony, and beyond the frontier. Mrs. Barber notes it as occurring "within an

extensive range of about ten yards, on a single hill-side, and flying close to the ground;" and Mr. Bowker also describes it as a ground-loving species. It is easy to understand how so minute an insect may escape notice, especially if it keep about spots of very limited extent.

In the Collections of the South-African Museum and R. Trimen.

2. *Lycæna Otacilia.*

Exp. 11 lin.—1 in.

♂. *Shining-violaceous. Fore-wing:* apical region, as far as end of discoidal cell and first median nervule, *rufous-brown;* borders of the same colour extend along costa to base, and hind-margin to anal angle. *Hind-wing:* a rufous-brown border, widest on costa, from base to anal angle; a rather conspicuous black spot on hind-margin between second and third median nervules; below the latter nervule, the trace of a similar spot. UNDERSIDE.—*Pale brownish-gray:* in each wing, the ordinary spot at end of cell, discal band of spots, and hind-marginal row of lunulate spots, darker than ground-colour, and incompletely ringed with white. *Fore-wing:* no spot near base; discal band curved inward below cell. *Hind-wing:* three rounded, dark, small, white-ringed spots near base, that above cell conspicuous, the other two (respectively in cell and below it) faintly marked; discal band so curved as half to encircle spot at end of cell,—part of its outer white edging confluent with inner white edging of lunulate spots; hind-marginal spot inwardly edged by an orange lunule; a minute, similarly-coloured spot at anal angle. *Cilia* dull-whitish.

♀. Unknown.

In one specimen* all the spots of the underside are much narrowed, their white edgings being widely and universally suffused.

This species is allied to *L. Emolus*, Godt., but is much smaller. The bright violaceous of the upperside, with the broad brown borders, render it easily distinguishable. The under-surface is more like that of the ♀ *Emolus*, and approaches also that of *L. Amarah*, Guérin, but differs from the former in possessing distinct basal spots on hind-wings, and from the latter in the want of the black basal bar of fore-wings.

Mr. Taats, of Swellendam, gave me an example, taken near that place, at the close of the year 1864; and I have

* From Swellendam, in the Cape Colony.

subsequently received specimens from Grahamstown, captured by Mrs. Barber, and from the River Tsomo, taken by Mr. Bowker. Of the special haunts or habits of this *Lycæna*, I have no information.

In the Collections of the South-African Museum and R. Trimen.

3. *Lycæna Tsomo.*

Exp. 9½—11 lin.

♂. *Pale shining-brown;* in each wing, the base narrowly tinged with purplish-black, and a faint pinkish-violaceous suffusion over median nervure and nervules, extending into discoidal cell. *Hind-wing:* a blackish hind-marginal spot between 2nd and 3rd median nervules. *Cilia* shining-grayish. UNDERSIDE.—*Pale ochreous-gray. Fore-wing:* the usual disco-cellular spot and discal macular band scarcely paler than the ground-colour, incompletely bordered with whitish; hind-marginal lunules almost obsolete; a whitish-ringed spot in cell, similar to that at extremity. *Hind-wing: macular discal band remarkably straight, externally bordered by a suffused whitish band;* an indistinct transverse macular band before middle, but no separate spots; hind-marginal lunules rather more apparent than in fore-wing; black spot distinct.

♀. *Darker; the violaceous suffusion much less, scarcely perceptible in hind-wing.* UNDERSIDE.—All the markings more distinct. *Hind-wing:* a spot closing cell, immediately before discal band.

On the upperside, this *Lycæna* much resembles the ♀ *Lysimon*, Ochs., but is widely different on the underside, which is very like that of *L. Bætica*, Linn., though on a smaller scale.

Mr. Bowker discovered this species in January, 1865, near the River Tsomo. It was "very numerous," in that month and the following, "in reedy, swampy spots near water."

In the Collections of the South-African Museum and R. Trimen.

4. *Lycæna notoba.*

Exp. 11½ lin.—1 in. 2 lin.

♂. *Shining opalescent-violaceous; a very narrow hind-marginal brownish border to each wing; cilia whitish, broadly interrupted with brownish.* UNDERSIDE.—*Brownish-gray:* in each wing, usual spot at end of cell, and macular

discal band scarcely darker than ground-colour, bordered with whitish. *Fore-wing:* macular band broad and curved; outer white edging of spot at end of cell prolonged towards inner margin; a similar spot in cell; hind-marginal lunules acute, indistinct. *Hind-wing:* macular discal band curved and irregular; a similar band before middle; a small, black, steely-dotted spot, inwardly edged by a faint-orange lunule, between 2nd and 3rd median nervules; a similar very minute spot at anal angle.

♀. *Grayish-brown; the violaceous duller, and, in each wing, only extending over median nervure and part of cell and median nervules. Hind-wing:* two distinct bluish lunules inwardly edging hind-marginal blackish spots near anal angle. Underside.—All the markings more distinct than in ♂, especially the hind-marginal whitish lunules.

The wings of this very distinct-looking *Lycæna* are rather more elongate than usual. I know of no species having close affinity with it.

Mr. Muskett forwarded to me, in 1864, specimens of this butterfly, taken near Murraysburg. In the following year he also kindly sent me some examples; and, in 1866, Mr. David Arnot, of Colesberg, presented me with a ♂ specimen captured in the Trans-Vaal territory.*

In the Collections of the South-African Museum and R. Trimen.

Family HESPERIIDÆ.

Genus Pyrgus, Hübn.

Pyrgus Sandaster, (Pl. V. fig. 9).

Exp. 11 lin.

♂. *Shining-blackish, with minute white spots; cilia blackish, interrupted with white. Fore-wing:* five minute white dots on costa, at ends of nervules; a narrow elongate white mark across cell, near extremity; an irregular discal row of five spots, strongly angulated inwardly, extending from costa to 3rd median nervule. *Hind-wing:* a spot in cell, near extremity; a row of three spots on disk, between discoidal and 3rd median nervules. Underside.—*Fore-wing:* base whitish, especially on costa; a square white spot on costa before middle; a faint white streak marking end of cell; some whitish scaling at apex. *Hind-wing:* ground-colour irrorated with whitish, densely so along inner margin; base whitish; two *sharp-*

* The late Rev. J. Frédoux also forwarded to Cape Town a ♀ of this species, taken at Motito, in Bechuana Land.

ly-defined ziczac transverse white streaks,—one before middle, including cellular spot,—the other beyond middle, interrupted near costa, slightly radiating on median nervules, and including discal spots.

This species is readily distinguished from the known South-African *Pyrgi, by the very small size of the white spots of upperside*, and by the dark underside ground-colour, with the two *narrow*, distinct, transverse, white *streaks* of the hind-wings.

The only specimen that I have seen is the ♂ above described. It was taken by Mr. Muskett, near Murraysburg, and kindly presented to me by that gentleman in the year 1864.

In the Collection of R. Trimen.

Genus Cyclopides, Hübn.

1. *Cyclopides Syrinx*, (Pl. V. fig. 8).

Exp. 1 in. 1 lin.—1 in. 2 lin.

♂. *Dusky grayish-brown, irrorated with pale-yellowish. Fore-wing :* a pale yellowish spot in discoidal cell, near extremity ; a discal row of six or seven smaller spots of the same colour, viz. three or four forming an oblique transverse outward-inclining streak between end of cell and apex, and three others (rather larger), of which the lowest is indistinct, in an inward-inclining line between 1st median nervule and sub-median nervure ; a hind-marginal row of six elongate, indistinct, yellowish marks, some of which are occasionally obsolete. *Hind-wing :* a clothing of yellowish-gray hairs from base over cell and along inner margin ; the trace of a yellowish spot in cell ; two spots on disk, between discoidal and 3rd median nervules ; a row of hind-marginal marks, much as in fore-wing, but rather confused towards anal angle. Cilia of the ground-colour, slightly mixed with yellowish. Underside.—Hind-wing, and costa and apex of fore-wing, thickly irrorated with yellow. *Fore-wing :* only upper spots of discal row distinct, and these (as well as cellular spots, and lower discal spots) sometimes almost obsolete. *Hind-wing : two longitudinal stripes from base to hind-margin*, one *creamy-white, broad*, traversing discoidal cell, the other narrow, whitish, between median and sub-median nervures ; no spots.

This *Cyclopides* may be said to combine the characters of *C. Malgacha*, Boisd., and *C. Lepeletierii*, Godt., differing from the former in having conspicuous pale stripes on the underside of the hind-wings, and from the latter

in being spotted with yellow. Its size, ground-colour, and hind-wing markings render it, however, a nearer ally of *C. Lepeletierii* than of *C. Malgacha*.

Mr. Bowker discovered this curious *Cyclopides*, on the 19th January, 1867, on the summit of Gaika's Kop, the highest point of the Amatola Mountains, being about 6,800 feet above the sea-level. He notes the species as being "very numerous among the *Mountain Bamboos*, flitting about in hundreds, but not found anywhere beyond the immediate vicinity of that plant."

The specimens before me all appear to be of the male sex.

In the Collections of the South-African Museum and R. Trimen.

2. *Cyclopides Ægipan*, (Pl. VI. fig. 9).

Exp. 1 in. 1½ lin.—1 in. 2½ lin.

♂. *Dark-brown;* cilia shining-brown, much varied with ochreous-yellow in hind-wing. *Fore-wing:* some inconspicuous ochreous-yellow irroration at base, chiefly on costa; beyond middle, on sub-costal nervules, a streak of two or three minute, indistinct, yellowish spots. Underside.—*Hind-wing, and border of fore-wing* (*widest at apex*) *shining yellowish-gray. Fore-wing:* sub-costal spots faintly marked; at apex an ochreous-yellow stain, extending for a little distance along hind-margin. *Hind-wing:* inner-marginal fold broadly blackish. *Abdomen* conspicuously tipped with ochreous-yellow.

♀. *Fore-wing:* an ochreous-yellow spot in discoidal cell near extremity; sub-costal spots much larger, conspicuous; below them, another spot, between 1st and 2nd median nervules. *Cilia* of fore-wing mixed with yellowish-gray; of hind-wing pale ochreous-yellow. Underside.—Hind-wing and border of fore-wing *yellower. Fore-wing:* sub-costal spots conspicuous; other spots almost obsolete. *Hind-wing:* inner-marginal blackish vague, ill-defined.

Described from three specimens of the ♂, and one of the ♀.

This insect is nearly allied to *L. Malgacha*, Boisd., but may at once be recognized by the total absence of spots in the hind-wing. The ♂ *Malgacha* occasionally varies in the spotting of the fore-wing, but the hind-wing markings are very constant in both sexes. *C. Ægipan* is also a larger insect; and the all but spotless upperside of the ♂ has a strong resemblance to that of *C. Lepeletierii*. From the latter and from *C. Syrinx* it is easily known by the absence of pale stripes on underside of hind-wings.

This *Cyclopides* also inhabits the Amatola Mountains, Mr. Bowker having met with it, a day after the discovery of the last-described species, on the summit of the "Hog's Back" in that range. It was "not uncommon among long grass in the neighbourhood of water."

In the Collections of the South-African Museum and R. Trimen.

Genus PAMPHILA, Fab.

1. *Pamphila* (?) *Mackenii*, (Pl. VI. fig. 8).

Exp. 1 in. 1 lin.—1 in. 2 lin.

♂. *Dull sooty-black: the last four segments of abdomen,* and the greater part of hind-marginal edging of hind-wing (with accompanying cilia) *pure white. Fore-wing:* usually two indistinct small, whitish, discal spots, between 2nd median nervule and sub-median nervure: *cilia* mixed with whitish. *Hind-wing:* the white edging commences about second sub-costal nervule, and is irregularly dentated inwardly. UNDERSIDE.—*Fore-wing:* costa, apex, and most of hind-margin irrorated with yellow; discal spots always visible, sometimes larger than above; on hind-margin, about end of discoidal nervule, a good-sized, circular, whitish-violaceous mark. *Hind-wing:* beautifully varied with white and brownish, and with fine dark-brown hatchings; beyond middle, *a broad, dark band,* occupying most of hind-margin, *much irrorated with yellow, and traversed by an irregular row of dark-edged violaceous lunules.*

♀? Duller; the discal spots of fore-wing much larger.

The example which I believe to be a ♀ of this species is much worn; but, with the exceptions above noticed, it does not differ from the ♂.

I doubtingly place this Skipper in the genus *Pamphila,* owing to the remarkable structure of the palpi, the terminal joint of which is very slender, acute, and directed perpendicularly upward, with a slightly-backward inclination. The club of the antennæ is externally edged with pure white.

There is no described species that I know of which nearly approaches *Mackenii,* but a Skipper in the British Museum, from Sierra Leone, strikingly resembles it in the white-tipped abdomen and edging of the hind-wings. The latter, however, is distinct, being of greater size, with a much broader head, and having white spots on the hind-wings, as well as a totally different dark-coloured underside.

I have named this species after Mr. M. J. McKen, Superintendent of the Botanic Gardens at D'Urban, Port Natal, from whom I first received it, and whose zeal in the cause of Entomology is scarcely exceeded by his well-known energy in botanical researches. I subsequently took the insect at D'Urban in June and August, 1865, and again in February and March, 1867. It is a woodland species, and rather uncommon; but generally found in spots of limited extent on the edges of woods, where it jerks rapidly about some favourite bush. I took one specimen on flowers of *Lantana*. When settled, it holds all the wings erect.

In the Collections of the South-African Museum and R. Trimen.

2. *Pamphila dysmephila*, (Pl. VI. fig. 10).

Exp. 1 in. 8 lin.

♀. *Pale brown, much clothed with yellow-ochreous hairs in basal region of wings. Fore-wing:* a small vitreous spot in discoidal cell, just above origin of second median nervule; two similar discal spots, of which the lower one is larger, between first and third median nervules. *Hind-wing:* spotless. *Cilia* grayish-brown. UNDERSIDE. —Paler; especially along costa of both wings. *Fore-wing:* vitreous dots as above, but the row continued almost to costal edge by a row of five blackish dots, sharply angulated on discoidal nervules. *Hind-wing: a conspicuous, straight, white streak* from base to hind-margin, running along sub-costal nervure and its second nervule; below streak the ground-colour is darker, gradually shading into paler; a strongly-curved discal row of six blackish dots. Club of *antennæ* blackish, conspicuously white just before the hook.

There is a nearly allied, but much larger *Pamphila*, from West Africa, in the British Museum; but this, besides the difference in size, has on the underside of the hind-wings a much broader whitish stripe, and the nervures also whitish.

The only example of this fine species that I have seen was taken by Mr. Bowker, in March, 1864, on the Bashee River, Kaffraria. It was captured "on a dark cloudy evening, about sunset, feeding at flowers in the garden, long after other butterflies had retired to rest; it flew from flower to flower, taking a sip of honey from each." J. H. Bowker, *in litt.*

In the Collection of the South African Museum.

III. *Remarks on Mr. A. R. Wallace's "Pieridæ of the Indian and Australian Regions."* By W. C. Hewitson, F.L.S.

[Read 6th January, 1868.]

I beg to submit to the Society a few remarks on Mr. Wallace's Catalogue of Eastern *Pieridæ*, from the perusal of which I had been expecting much pleasure and instruction.

And first, as to genera. Mr. Wallace has adopted *Thyca*, proposed by Wallengren, but rejected by Vollenhoven, and has made two new genera of his own, *Tachyris* and *Prioneris*. I cannot think that a genus which like *Thyca* or *Tachyris*, is established on one character only, unaided by some general trait which at once points it out to the eye, and especially where, as in *Tachyris*, that distinctive character exists in one sex alone, will be any aid to the study of the *Pieridæ*. Although in these remarks I shall, for convenience of reference, quote *Thyca* and *Tachyris*, I do not think that I can adopt them as genera.

Secondly, as to species. After luxuriating in the beautiful new species which Mr. Wallace has given us in his *Hyparete* group of *Thyca*, one is met by the resuscitated ghosts of many that I had hoped were laid for ever. Out of 172 names (I speak only of *Pieris* as it was), there are fifty which I would place as synonyms. It seems incomprehensible to me that I, certainly not tainted with Darwinianism, should have to contest this point with a gentleman who, according to theory, ought not to recognize species at all.

The following references are to the pages of Mr. Wallace's paper, in Tr. Ent. Soc., 3rd series, vol iv.

Pieris narses, Wallace (p. 333).

I cannot adopt this name; for bad as Donovan's figure of *perimale* may be, it was certainly intended for this species, and the name *perimale* must be retained.

Pieris nama, Moore (p. 340).
Pieris nadina, Lucas (p. 341).

These are the same species, and Lucas's name has priority.

Pieris nesba, Lucas (p. 341).
Thyca agostina, Hewitson (p. 353).

P. nesba is the female of *agostina*; and the latter name has priority. My description and figure were published in April, 1852; Lucas's description in July, 1852.

Pieris ajaka, Moore (p. 342).

This does not differ from *P. melite* of Ménétries.

Pieris pigea, Boisduval (p. 342).

Mr. Wallace gives China as the habitat. I believe it is an African species. My specimens, which I suppose to be referable to this species, are from Natal.

Pieris kalora, Moore (p. 343).

This does not differ from *P. callidice* of Europe.

Thyca lanassa, Boisduval (p. 361).

This differs little from *Pieris nabis*, Lucas (p. 332). Both of them are probably mere varieties of *P. rachel*, Boisduval (p. 331). At any rate, *lanassa* belongs to the genus *Pieris*.

Tachyris nerissa, Fabricius (p. 364).

Two of Cramer's figures of *zelmira*, E and F, which Mr. Wallace quotes as females of *nerissa*, belong to another species, and have a male similar to *orbona*, Boisduval, from Madagascar.

Tachyris paulina, Cramer (p. 369).

I wonder that Mr. Wallace should place *neombo* of Boisduval as a variety of *paulina*. *Neombo* is constant in the outline and breadth of the black margins. I have males, resembling *ega* of Boisduval, which are decidedly the other sex of *neombo*. I cannot discover what Mr. Wallace considers the distinction between *paulina* and *melania*, Boisd. (which he gives as the female of *ega*), when he unites Cramer's fig. 110 F, which has not any border to the posterior wing on the underside, with Hübner's fig. of *leis*, which has a broad border. I must also express my want of belief that *albina* is the male of *paulina*; it is certainly not the male of *neombo*.

Tachyris ega, Boisduval (p. 371).

Mr. Wallace proposes (p. 316) to drop the Fabrician name *melania* altogether, as being a species "which has not yet been properly identified, and probably never will be" (p. 371). The original specimen of the *melania* of Fabricius is in the Banksian cabinet, and agrees with Donovan's figure, which was evidently made from it. The anterior wing has its base of rich orange; the posterior wing is altogether pale, with a band of darker brown a little below the middle, followed by some indistinct white spots. It seems to be distinct from *melania*, Boisduval.

Tachyris Jacquinotii, Lucas (p. 372).

I believe this has no relationship with *zoe*, Vollenhoven, or *agave*, Felder, or with the group to which they belong; and if I can trust my memory, and a note made several years ago, *Jacquinotii* is the same as *Pieris isandra* of Boisduval, a South-American species. Lucas says that it comes from New Guinea. He may be in error, I may be more so.

Tachyris nephele, Hewitson (p. 380).

This should come next to *ada* (p. 367); Mr. Watson tells me it has the same plumules. It is probably another variety of *lyncida* and *hippo*.

Prioneris thestylis, Doubleday (p. 384).
Prioneris seta, Moore (p. 384).

P. seta, Mr. Wallace says, is "a very puzzling species." But it seems to me that he has himself created the difficulty by describing as the male of *seta* an insect which belongs to a different species, and by assigning to that male (after the fashion of some of his oriental species of *Papilio*) two females which are totally different. *P. seta* of Moore is the female of *thestylis* of Doubleday; and the insect which Mr. Wallace describes as the male of *seta* is a closely-allied species with a female which scarcely differs from the male. I propose to call this species *Prioneris Watsonii*, as a recognition of the good work which my friend Mr. Watson has done and is doing to elucidate our favourite study. I should have done this a year ago, when I sent a note upon this group of butterflies to the

Society (see Proceedings, 1866, p. xxxv), and referred to the undescribed species allied to *thestylis*, but I was unwilling to intrude upon Mr. Wallace's work.

The synonymy of the two species will be as follows:—

Prioneris thestylis.	Prioneris Watsonii.
♂. *Pieris thestylis*, Doubleday.	♂. *Prioneris seta*, ♂, Wallace.
♀. *Pieris seta*, Moore.	♀. *Prioneris seta*, ♀, 2nd form, Wallace.

I may add that the male of *P. Watsonii* is readily known from *thestylis* by wanting the broad macular border on both sides of the posterior wing, and by the much richer and more beautiful colour of the underside of that wing, which in *thestylis* is pure yellow, but in *Watsonii* is orange. This species is so interesting that I shall figure it in "Exotic Butterflies."

Prioneris clemanthe, Doubleday (p. 385).
Prioneris berenice, Lucas (p. 386).

I have seen *P. berenice*, it is the same as *P. clemanthe*.

Prioneris cornelia, Vollenhoven (p. 386).

A specimen in my collection is much more richly coloured than Vollenhoven's figure. The underside has the upper-wing suffused with black, except near the inner margin, and the white spots almost obliterated, and the under-wing of a brilliant deep yellow.

IV. *On* Burmeisteria, *a new Genus of* Melolonthidæ. By Frederic Schickendantz.

[Read 6th January, 1868.]

I beg to send to the Entomological Society of London a description and drawings of a very curious insect, of which I took in February, near Pilciao, a single specimen in the flower of a leguminaceous plant. I have sent it to Dr. Burmeister, of Buenos Aires, who informs me that the insect possesses great interest, being a typical representative in South America of a group which has hitherto been observed only on the shores of the Mediterranean, in South-Africa, and in New Holland. According to the views of that learned Entomologist, the beetle belongs to the aberrant group of *Melolonthidæ* which, in his "Handbuch der Entomologie" (IV. ii. 428), he has named *Leptopodidæ*, and is in some respects intermediate between *Macrophylla* (p. 447) and *Pachypus* (p. 462), but differs from both by the open suture, and by the prolongated metanotum, which has never before been observed in any of the forms allied to the present insect. In honour of the distinguished naturalist who has contributed so much, not only to the advancement of Entomology, but also to the scientific knowledge of the Argentine Republic, I propose to name this curious insect *Burmeisteria mirabilis*.

BURMEISTERIA.

Genus novum Coleopterorum Lamellicornium (*Phyllophaga, Leptopodidæ*).

Clypeus parabolicus, porrectus, margine subelevato, valde descendente. *Instrumenta cibaria* debilia; labrum parvum, integrum, parabolicum; mandibulæ et maxillæ absconditæ; labium triangulare, paulisper concavum, setis longis rigidis utrinque fimbriatum, medio nudum; palpi breves, articulo ultimo ovato. *Antennæ* articulis 10; primo incurvo, clavato; sequentibus tribus æqualibus, nodiformibus; quarto mucronato; sex ultimis flabellum sat longum hexaphyllum formantibus. *Pronotum* transversum, subpulvinatum, lateribus obtuse angulatum, in omni margine pilis mollibus longis albis hirsutum.

Scutellum late cordatum. *Elytra* singula triangularia, postice multo angustiora, subacuminata; sutura aperta, longe et late hiante. *Metanotum* postice prolongatum, processu triangulari, excavato in apice binodulo, in suturam apertam intrante et ultra mediam suturam descendente. *Alæ* in apice suturæ apertæ libere prominentes. *Pectus* et *abdomen* densissime pilis longis mollibus albis hirsuta; pygidio cordato, usque ad basin abdominis retracto. *Pedes* longi; femoribus sat validis; tibiis brevibus; tarsis longis, gracilibus, setosis, ultimis longissimis et fimbriatis. *Tibiæ* anticæ compressæ, extus tridentatæ, calcare minutissimo; mediæ subcylindricæ, extus carinis duabus setosis et in apice corona setarum munitæ; posticæ valde clavatæ, similiter armatæ, utræque calcaribus duobus inæqualibus obtusis pellucidis, postico subfoliaceo. *Ungues* tarsorum 4 anticorum æquales, basi dilatati, pellucidi, et fissura obliqua divisi; posticorum simplices, valde inæquales, tenues, internus brevissimus. Articuli tarsorum omnium longitudine decrescentes, in apice setosi, ultimorum superne et inferne setis rigidis nigris fimbriati. (Sexus masculinus. Femina probabiliter figura differente, corpore crassiore, pedibus brevioribus, et forsan aptera).

Burmeisteria mirabilis.

B. nigerrima, subtus et in limbo pronoti pilis mollibus albis hirsuta; pygidio nudo, nitido. Long. corp. 9 lin., ped. post. 10 lin. ♂.

Hab.—In floribus *Leguminosarum*, circa Pilciao, ad pagum Andalgalá provinciæ Catamarcæ.

Body stout, entirely black, somewhat resplendent; the whole underside, the outer border of the pronotum, and the edges of the legs, covered with long soft white hairs. The clypeus and front densely punctured, with short compressed white hairs; the naked middle of the pronotum with very fine punctures, and a longitudinal polished median line. Scutellum not so densely punctured, with a polished median line and outer margin. Elytra dull black, with polished shoulders, and two elevated longitudinal ridges, the surface punctured here and there, the punctures with a raised border. The conspicuous part of the metanotum is the open suture, longitudinally deepened, with punctures and white hairs therein, and two prominent notches at the end. Pygidium and middle

of the postpectus naked, polished and punctured on the sides, with long white hairs in each puncture. Legs polished, the femora and tibiæ densely covered with long white hairs on the margins, and with black bristles on the sides and the margins of the tarsal joints; the posterior tarsi with long black hairs on both sides above and below, and some white hairs at the beginning of the inside.

The female has not yet been found. The above descriptions have been submitted to Dr. Burmeister.

Explanation of Plate VII.

Fig. 1. *Burmeisteria mirabilis*, ♂, natural size.
2. The antenna, magnified.
3. The mouth; *a*, labrum; *b*, *b*, maxillary palpi; *c*, *c*, labial palpi; *d*, mentum. Magnified.
4. Claws of anterior tarsi, magnified.
5. ,, of posterior tarsi, magnified.
6. The pygidium, seen from below; natural size.

V. *On the "Coffee-borer" of Southern India* (Xylotrechus quadripes, *Chevrolat*). By J. W. Dunning, M.A., F.L.S., &c., *Sec. Ent. Soc., late Fellow of Trinity College, Cambridge.*

At the meeting of the Society held on the 6th January, 1868, I exhibited specimens of the Coffee-tree attacked by the "borer," and of the larva, pupa, and imago of the insect, which were sent to me by the Rev. G. Richter, Principal of the Government Central School, Mercara, in the province of Coorg. The following extracts, relating to what my correspondent terms "the Borer pest in the coffee districts of Southern India," may prove interesting; and I have added a wood-cut of the beetle, with a few words on the genus *Xylotrechus* and its nearest allies.

From the Proceedings of the Agri-Horticultural Society of Madras, 1867.

(*Extract from the Season-Report of* Mr. J. W. Minchin, *dated* Wynaad, *May,* 1867.)

"In some of the dry districts many of the estates have suffered from the 'Borer.' The trees were probably attacked during the long drought of last season, and the consequences of its attack are now becoming apparent. It is evident that trees not in full vitality are most liable to the attack of the Borer, for on forest estates in moister localities there is very little seen. The remedy, therefore, is evidently to support the trees by manure, burying in weeds, and digging up the earth round the roots. This last I think should be done during the dry weather, not to any great depth, say three or four inches. It enables any dew or showers that may fall to penetrate the soil, and the feeding roots can search for fresh support, which, when the ground is baked hard, they are unable to do. I am sure that trees when assisted in this way will recover from the injury done by the Borer, and that it cannot be advisable to dig out the trees, although they should be relieved of dead wood and crop."

(*Extract from a letter of* Mr. Alexander Vertue, *dated* Ootacamund, 11 *June*, 1867.)

"In the neighbourhood of Goodaloor and Duralah, the Borer is making great havoc. As yet we have, however, every reason to hope that the crop from Terriout, South Wynaad, and the Charambady Division of South-East Wynaad will be very good.

With reference to the Borer, I myself believe that we are now paying the penalty for slovenly cultivation or total want of cultivation, which was generally the rule a few years ago in the coffee districts of this Presidency, and the droughts of three seasons have no doubt assisted the grub materially. On forest estates which from the commencement have been kept perfectly clean, or on bamboo estates which have been regularly trenched and kept in good order, I do not think the Borer will ever be very destructive. I may, of course, be in error as to this, but time will show. We hear of many remedies; one man recommends tar, another suggests that the trees should be washed with a solution of various things; but although these experiments may be tried with success in a garden, it is a very different matter when one has a field of 200 or 300 acres of coffee to work on."

(*Extract from a letter of the Rev.* G. Richter.)

"But what is the meaning of sickly-looking trees with drooping leaves that begin to turn yellow? We examine them closer. You shake such a tree—it cracks and breaks clean off just level with the ground! The broken stem betrays the cause of this destruction; we just see the retreating enemy: a footless yellowish-white larva with a ferocious horny mouth of darker hue. This is the Borer—the coffee-planter's terrible enemy! We split the stem of a six-years' old tree, and the open halves reveal in every direction a number of intricate passages infested by many larvæ. In some instances they are found in company with pupæ and perfect insects, ready to escape through the burrows opening outside the bark, and to deposit their eggs upon healthy trees.

The insect is not a 'fly,' as commonly called by planters, but a beetle belonging to the section *Tetramera* of the order *Coleoptera*, as it has four distinct joints to all the tarsi, and answers best to Cuvier's *Platysoma* and

the genus *Cucujus*. The species itself may perhaps be termed *Cucujus coffeophagus*. The full-grown beetle is about three-quarters of an inch long, and has an elongated cylindrical body. The head is small and depressed: the eyes are large and prominent, with a small whitish indentation near the root of the antennæ, which are filiform, eleven-jointed, and pointed at the tip, the first joint being thicker and the second shorter than the rest. The antennæ just reach over the prothorax. The mandibles are short, strong, and horny. The prothorax is slightly oval, nearly as broad as long, and marked by three black roundish spots, the middle one being four times larger than those on the sides. The remaining surface of the prothorax and part of the head are covered with short grayish hairs, that under the microscope present the appearance of a seal-skin in miniature. The upper wings are thin but horny, long, narrow and black, with three symmetrically curved greenish streaks or bands, and a perpendicular one at the top, forming on the left wing with the first curve the letter Y. The abdomen has six rings of a similar colour, and terminates in a horny sting-like appendix. The hind-legs are particularly long, and indicate, by their strong light-brown femora, considerable walking and jumping powers. The other joints are black, and the tarsi are armed with two cleft claws.

It does not seem that the beetle continues the devastation of the larva. I discovered in one tree larva, pupa, and beetle together; the larva boring upwards, the pupa lying inactive in a burrow opening outside and large enough for the passage of the perfect beetle, which I found with its head towards the opening of the hole. In some cases, as many as twenty-four larvæ have been extracted from a single tree, and one planter assured me that he saw the beetles swarming. Another observed some beetles seated on the stem of a tree, in the act, apparently, of depositing their eggs. It is under the bark, and, in most instances, directly above the root, that the larvæ begin their burrowing, winding half round the stem, and then working upwards and inwards in every direction; and when arrived at maturity, the larvæ seem to open a passage for the exodus of the future beetle, since the pupæ do not burrow.

Another more innocent Borer was known for some years—the red Borer. It was generally found in new wood, but though the top or a branch of a tree may have

withered, the tree itself was thereby not destroyed. The larva was red and larger than the one described, and no one troubled himself much about it.

The coffee-pest will—as the dark cloud of locusts—certainly pass over; the Borer does not of necessity belong to the coffee-tree; where there is hope there must be activity. Without doctoring and wasting money on doubtful remedies, I would destroy every affected tree on the plantation; for if once attacked, it is hopelessly gone. Though half an estate may be lost, where the means are available and the soil is good let it be planted over again, and, where the Borer has not yet shown itself, plant a new tree between every four, that it may replace any of the old ones should they be attacked, as the Borer prefers old stems. And since it seems to be an established fact that coffee-trees under judicious shading are free from Borer, let every planter in Coorg introduce shade-trees for his young coffee; at least give it a fair trial."

(*Remarks by the Committee of the Agri-Horticultural Society of Madras.*)

"For some years, an insect called the Borer has been known in Ceylon and other coffee-producing districts, but it is quite different from the one now in Coorg, being the caterpillar of a moth called *Zeuzera*, whereas the Coorg Borer, according to Mr. Richter, is the larva of a beetle. Another caterpillar, the Black Grub, has also done considerable mischief on coffee estates by ringing the stems just above ground; but it has never been so general, or appeared in such numbers, as the present enemy. It chiefly confines its attacks to young trees, and is the larva of *Agrotis segetum*. The curious in these matters will find abundant information on the subject in a pamphlet, 'Enemies of the Coffee Tree,' by J. Nietner, Esq., published in Ceylon in 1861. The Coorg Borer hardly appears to have been observed there until the present season, but now it has appeared so suddenly, simultaneously and in such numbers throughout a large province, and under such varying conditions as to soil, elevation, culture, &c., that there cannot be a doubt that it has been called into existence by the operation of some general cause. Both Mr. Minchin and Mr. Richter seem to think that this cause has been the long-continued

drought of the past two seasons, and we believe that is the generally prevalent and correct opinion. A dry state of the atmosphere is, under certain conditions, favorable to the multiplication of many forms of insect life, and, in the case of the *Scolytus* (a borer), which destroys the elm, it is a well-known fact that while a dry season fosters it, the presence of moisture and the rapid circulation of the sap immediately stop its ravages. Accepting the drought, therefore, as the chief agent in the production of the Borer, the most natural remedy, as suggested by Mr. Richter, appears to be cultivation of the coffee under shade; a system regarding which the Committee have for a considerable period been seeking to elicit the opinion of experienced planters. *Doctoring* by the application of remedies may be of temporary, but cannot prove of any permanent benefit, and will not avert the total ruin which at present threatens a most important branch of industry and source of revenue. It does not seem very clear whether the ova of the beetle that produces the Borer are hatched in the ground or not; but, if so, a liberal application of lime to the soil might, as in the case of the wire-worm, ensure the destruction of the insect."

(*Extracts from the* Coorg *Season-Report, by the Rev.* G. Richter, *dated* Mercara, 1 *July*, 1867.)

"Much has already been written about the 'Borer' in Coorg, but I should hardly do justice to my task did I not revert to the subject in my season-report on the the past quarter. I need, however, not enlarge on the blasted prospects of some planters who were so full of hope at the flowering season of the coffee-tree in March last. The epidemic is an undisputable fact, and elicits the sympathies of every one who has become acquainted with its ravages. These were especially apparent in April and May, but with the commencement of the rains they showed themselves less visible, whether to appearance only or really and permanently, the future will disclose. It is, however, confidently asserted by planters in various districts of Coorg, that the pest is passing away. Whilst sincerely wishing this to be the case, and feeling most inclined to forget the unpleasant subject altogether, still there are a few notable facts which may

prove interesting to the planter as well as to the entomologist.

In my description of the coffee-beetle, I should have added a few more characteristic traits of the destructive operations of the Borer, and a few touches on the organization and habits of the beetle.

On examining since a number of destroyed coffee-trees, green and dry and of various ages, in company with some planters, we elucidated these facts, and the accompanying sections of stems afford the proof.

Sections 6 and 7 are of a one-year old tree from an originally large plant, the diameter at the botom is one inch. The Borer penetrated just above the root, worked horizontally all round, leaving only a few fibres of wood near the centre and the bark all round, and then ascended sideways and upwards through the heart-wood for eight inches, when I discovered the Borer and stopped its progress. A slight shake was sufficient to break off the tree. On a young estate of one year's growth near Mercara, thousands of trees have thus been attacked and killed.

Sections 4 and 5 belong to a tree of four years' growth, and two and a half inches in diameter. The saw-cut is made just under the first pair of primary roots, and it shows a perpendicular burrow which reaches still further into the cut-off taproot. There are side passages opening outside the bark, and one cuts clear of the primary root. In this stem the Borer had not ascended beyond two inches above ground, the wood above is intact, but still the tree could not live. A pull and a wrench snapped it off above the root.

Section 8, of a tree two and a half inches in diameter, and four years old, shows the horizontal windings and the cross cutting power of the Borer. The cut is nine inches above the ground, but the lower part down to the root is eaten through. There is only three-eighths of an inch of wood left on one side holding the severed stem together, and a slight shake knocked the tree over.

Sections 1, 2, and 3 belong to five-year old trees, and clearly exhibit the fantastical intricate confusion of tunnelling by a multitude of Borers, which, however closely approaching, keep their burrows distinctly separate from each other. In all the above sections the interior passages, except the portion near the orifice, are closely packed with the woody excrements of the Borer. On the bark we observe numerous round open holes of

different dimensions, each communicating with a distinct burrow within. For the length of about two inches from the orifice these burrows are wider than further in, and more irregular in shape; in fact, they form the cradle of the struggling insect in its disentanglement from the pupa to the imago state, for it is here that the mature larva closes its destructive career, and rests awhile in the pupa state to resume its pernicious work on an extended scale by the beetle's numerous progeny.

The orifices are small and large, in proportion to the size of the Borer-larva and beetle, and it would appear that it is the larva which scoops out the passage for the beetle. It is, however, doubtful whether the hole through the soft bark is made by the larva or the beetle —a most important point to ascertain. The providential economy of insect life would lead one to suppose that the orifice is made by the beetle, which lies asleep in its cradle safe from intruding ants, till it opens the little bark shutter, and escapes from its dark chamber into the sunny air. In one instance I found a perfect beetle—dead; it could not escape, for the passage does not communicate with the outside, it stops short still in the hard wood. The beetle must have been alive, and if it were its habit to burrow, it would have eaten its way out of prison.

The female beetle is of equal size and appearance with the male, and is easily recognized by the horny sting-like appendage of the abdomen, which in the male terminates in a roundish sheath. On examining under the microscope the dissected abdomen of the female beetle, I found the ovary full of round yellowish-red eggs, and I am told on good authority that a planter who confined a pair of newly-hatched beetles under a glass counted two hundred eggs deposited by the female, which fecundity accounts for the numerous Borer brood in a single tree. The eggs are laid under the bark of a coffee-tree and close to the root, whether in a natural fissure of the bark or a puncture by the female beetle, is not certain; but the first burrowing of the newly-hatched larva can be traced to a slight hollow under the bark, whence it proceeds between the outer bark and liber till the larva is strong enough to eat into the hard wood. It does not seem that many eggs are deposited in one spot, for there are not many burrows radiating from one common point. The eggs are apparently laid in November and December, and hatched in the beginning of the

warm weather in February and March. The larva is full-grown by July, when it enters the pupa state, and is transformed into the beetle after the monsoon. I am, however, not so very positive about these data, but I hope to ascertain the facts after further investigation.

The symptoms of a tree with the Borer in it are these: cessation of vigorous growth, peculiar twisting or curling of the terminal leaflets of the primaries and secondaries, foliage in general languid and drooping, and, in advanced state of burrowing, yellow.

From all the foregoing statements we may draw the following conclusions:—

1. The white Borer penetrates the coffee-trees, and, especially when young, generally at or close to the root, originating from eggs which are deposited by the coffee-beetle (*Cucujus coffeophagus*), not cumulative but dispersed under the bark.

2. The larvæ ascend and descend the tree without interfering with each other's burrows, and prefer the hardest wood, themselves closing their passage behind as they proceed; they cannot be reached by any external means.

3. When mature, they approach the bark for their transformation, and it is probable that, though they burrow up to the bark, they do not penetrate it for the egress of the future beetle.

4. Any appliance of means to destroy the insects *in* the tree would only affect them *after* the tree has received irreparable injury. Remedies do not save the affected tree, but by killing the insects a further spread of the Borer pest is prevented.

5. It is therefore essential to know the time of the impending exit of the beetle, and should the orifices be open before the larva enters the pupa state, the closing up of these orifices by any insect-destroying drug would prove a safe remedy, not, however, for the preservation of the young and suffering tree.

6. The shortest way to effect the same result is the up-rooting and smashing of the tree at the first sign of the Borer.

A word regarding 'planting under shade.' Six miles from Mercara on the Virajpet road, in dense forest land, is the plantation of the Naib Sheristadar B. Bopie, adjoining to it that of a European planter. The latter estate has the Borer, whilst the former has it not. This is under shade, the other on an open clearance. The

shade is too dense, and consequently the trees look thin, lank, with dark green foliage and scanty fruit, but where they approach the clearing they are splendid in size and fertility, and have no Borer. This fact induces me to believe in judicious shading, whether in bamboo or forest land."

(*Extracts from the* Coorg *Season-Report, by the Rev.* G. Richter, *dated* Mercara, 15 *October*, 1867.)

"In my last season-report I stated some points as still doubtful, viz., the mode and time of egress of the coffee-beetle, the mode of depositing its eggs, the period of development of the several transformations of the insect. To investigate these matters, I made the following experiments.

1. On the 2nd August last I examined some coffee-stems with the Borer in them. I cut them up into several pieces of convenient size, and carefully split these open, to mark the position and appearance of the larvæ; three of these seemed to be full grown, and four of smaller size. Joining the pieces carefully together, I preserved them in a glass box. On re-opening them after a few days, the larvæ had filled the exposed burrows with the woody excrements and made themselves invisible. Yesterday (14th October) I split the same pieces in different places, and out of the seven Borers in the larva state on the 2nd August I found three transformed into the pupa state, the other four were still larvæ in full activity. The pupæ lay with their heads close to the bark, which was however *not* perforated.

2. On the 3rd Oct. I split a dozen trees attacked by Borer, and secured four pairs of full-grown beetles alive, besides many pupæ and larvæ. In every instance I found the two former in their burrows, shut up from the outside by the bark only.

In order further to examine the habits of the beetle, and especially the mode of laying its eggs, I made arrangements which represented as much as possible the natural condition of the habitat of the insect. I took a glass shade two feet high, nine inches wide, and open at both ends. This I placed upon a board, and cutting the stem of a fresh coffee-tree into two pieces of the requisite height and lateral width, with leaves attached, I placed them in the cylinder, the bottom of which I covered with

two inches of earth, taken from round a coffee-tree. It was towards evening when I liberated the beetles from their dark narrow prison, and placed them in the glass; they were very lively, and I expected a strong light would have now, if at all, a most startling effect upon the insects; but they remained perfectly indifferent, and likewise during the following nights, when at different hours I approached the glass with a bright lamp-light. The insects are therefore not nocturnal or crepuscular like moths and flying ants, and lighting fires or hanging up lanterns, to attract and catch them, is quite useless. The coffee-beetle, as I shall presently show, is most active during the hot hours of the day, quiescent during the night, and rather so during the cool hours of morning and evening.

On Friday morning, the 4th October, I watched the four pairs of beetles most attentively. To distinguish them individually, I mutilated their legs in different ways. The glass was kept in an open verandah, and about nine o'clock, when the sunlight fell upon it, the beetles set out to reconnoitre their terrain. They walked about quite sprightly, ascended the stems, even marched up and down the glass, and clambered over the uneven soil, which, however, on account of their long and clawed hind-legs, they found rather difficult to accomplish, and, if upset, they could not easily turn over. The stem of the coffee-tree they evidently enjoyed as their home. If it were not for the calamitous ravages of the insects, one would feel inclined to observe them with admiration. They are pretty in appearance, elegant in form, attentive to their toilette, smart in their movements, and easily offended by an opponent, whom they attack unmercifully with their horny mandibles. When together in close quarters, they bite off each other's limbs in the struggle for ascendancy. In a glass bottle, where I kept ten beetles for three hours, I found the bottom covered like a battle-field with mutilated limbs. They do not readily take to their wings, but, though not constituted for long flights, they can easily fly from one tree to another.

After eleven o'clock, I observed their inclination to that function of insect life, which seems to be the very purpose of their existence in the perfect state. There were at first only two pairs in activity, and the females soon afterwards commenced depositing their eggs, generally moving along with the males superimposed; they are, however, not monogamous. The eggs are not

laid in any regular order, but the female beetle roams over the stem in every direction, except under ground, and places her eggs alongside and into the natural fissures of the bark. The ovipositor is so organized that it serves as a most flexible and delicate feeler of the proper locality for the egg, as well as for conveying the egg to that spot. As the beetle moves over the stem, this organ is in constant activity, sweeping like the finest hair-brush over and into every little cavity, and stopping occasionally with unerring instinct in the proper place, where it securely drops one or several eggs. After ten days' careful observation, I am unable to say with any degree of certainty, how many eggs each female has laid or may lay. Of the eight beetles put into the glass, five died after six days' activity; they laid daily some eggs; two females and one male are still alive and active. Yesterday and to-day I examined the two stems, to discover the eggs, and I found on one piece, one foot nine inches in length, over fifty eggs, and on the other, one foot long, thirty-four eggs. The greatest number, grouped in one fissure, was eight eggs; there are none upon the branches on account of their smoothness, but they are most numerous in and round the axilla of the primaries. The eggs are whitish, elongated, and pointed at the top. The laid eggs are so securely hidden in the fissures of the bark, whether perpendicular, oblique or horizontal, that they are visible only on removing the epidermis and part of the corky layers of the bark. One burst open, and I secured the embryo larva, which is just discernible with the naked eye, but which under the microscope exhibits every characteristic of the full-grown Borer, even the reddish-brown head.

3. In order to find out what effect coating the stem with lime would have upon the beetles, I treated a piece of a fresh coffee-tree in this manner, fixed it into another glass shade, and put the ten mutilated beetles into the glass. Those which still were able to walk, attempted to crawl up the tree, but soon fell off, their claws could only seize the coating of lime, which peeled off and caused the beetle to fall. Next morning most of them were dead. Yesterday I transferred the three active insects of the former experiment to the white-washed stem, and added a second male. They managed to climb up the stem, but the females found on the white-washed surface no hiding-place for their eggs, and repeatedly dropped to the ground. I left purposely the axilla of a primary

unwhitewashed ; this they soon found out, and deposited there the eggs. This evening a shower of rain fell, when I exposed the open glass to its full influence. The beetles sought shelter under the primaries, and are, I believe, not much affected by the rain.

As a *resumé* of all these experiments and observations, I venture to draw the following conclusions, in addition to, and modification of, my former statements :—

1. It is the beetle and not the larva, which, for its egress from the tree, eats a hole through the bark. Any artificial injection or filling up of these holes to destroy the pupæ or larvæ, would be like locking the door after the horse is stolen.

2. Since the larvæ in the tree cannot be reached by any external remedy, we are left to deal with the beetle and its eggs only.

3. The beetle is diurnal in its activity, not gregarious or migratory, and unaffected by light at night. It is generally quiescent during the cool hours of the day, and seated upon the stem. It may therefore with ease be collected. No doubt many are carried off by birds ; these should therefore be encouraged on an estate by fruit-yielding shade trees. It appears that lizards also are active in destroying the beetles.

4. The beetles make their appearance directly after the monsoon, propagate their species, and die off, but are replaced by new generations all during the dry weather. I have not observed that they feed on any part of the coffee-tree.

5. The eggs are hatched within a fortnight after deposition, and it is in the state of the larva that the insect has its longest existence, which may be estimated at about nine months. The pupa lives as such in a quiescent state in the tree for about two months, and the beetle, after its egress, exists but for the short space of a fortnight.

6. There is no human remedy which would, as by magic, dispose of the Borer-brood wholesale ; we must grapple with the plague in patient, painstaking, and successive efforts, which will be the easier, the younger an estate is, and the less damage has been done.

7. Every attention must now be directed towards the prevention of a successful deposition of the beetle's eggs, or the hatching of the same.

8. The cheapest and most efficient way to obtain both objects, appears to me this—first, rubbing energe-

tically the bark of the stem, and especially round the axilla of the primaries, with a rough coir-glove, as used for cleaning bullocks, or still better, with a short wire brush, made in the shape of a nail-brush; mere hand-rubbing is impracticable to a large extent; and secondly, white-washing the stems from top to bottom, and the primaries from the axilla one or two inches upwards with lime. The lime will, eventually, when dropping off, serve as manure and repay its cost. Tar is too expensive and apt to kill young trees. To make the lime more adhesive, a gelatinous liquid, obtained by soaking the bark of the wild cinnamon and Culur Mavina or Poon tree in water, may be admixed.

9. These remedies are, however, only preventive against the spread of the Borer-pest, and do not save a tree already far gone. Any such tree must be eradicated and destroyed.

10. As the Borer appears, however, generally sporadic on an estate, it would appear sufficient, to treat at first—but without delay—the healthy trees which are in the neighbourhood of such affected spots, after having carefully destroyed the Borer trees.

11. He to whom such treatment appears impracticable to a large extent, must make up his mind, either to save with certainty a smaller area, or risk the inevitable destruction of his whole estate.

12. From the difficulty we find in overcoming this plague on an extensive acreage of cultivation, we may learn, perhaps, the true mode of coffee culture, and the truth of the maxim: that a hundred acres, well cultivated and carefully superintended, are more profitable than a thousand that cannot be properly managed."

(*Extracts from a Report by Dr.* George Bidie *to the Madras Government, dated* 16 *Oct.* 1867.)

"I have the honour to report, for the information of Government, that, in the month of September, I visited Coorg, with a view to collect some facts regarding the ravages of the insect called the Borer, which has lately caused such destruction on coffee plantations there, and in the neighbouring districts of Wynaad and Munzerabad. It is now upwards of four years since I last visited Coorg, and the first thing that struck me on the present occasion was the altered appearance of the country. In every

direction the sides of the hills and ravines have been stripped of their umbrageous forests, and, instead of the magnificent expanse of living green that used to meet the eye on all sides, we have numerous sterile-looking tracts, which give a peculiar air of desolation to the prospect. Did the evil, however, effected by clearing, not extend further than this, it would be of no great consequence ; but, as has already been brought to the notice of Government, the extensive destruction of forests in Coorg has had a serious effect on the streams, that, rising amongst its hills, descend to fertilize the plains. There is no reason to suppose that, although every tree in Coorg were cut down, the rain-fall would be sensibly diminished, as its amount depends chiefly on the geographical position and physical conformation of the country, but the existing clearing has, undoubtedly, had the effect of causing a large portion of the monsoon water to run off almost immediately, instead of lodging in the forests as it used to do, and, by evaporation, rendering the air moist during the dry season. I have no doubt that this change in the drainage of the country caused the droughts of late years to affect Coorg much more seriously than they would otherwise have done, and feel sure it will continue to render the culture of coffee there always more or less precarious. Coffee is a plant which delights in a moderately warm and moist atmosphere, and suffers much when subjected to a dry heat. Considering, therefore, that in Coorg it is deluged with rain during six months of the year, and exposed to scorching sunshine, with the earth baked as hard as a brick, during the remaining period, it is astonishing that it thrives there so well as it does. I have made the foregoing remarks with a view to show, that the vigour of the coffee plant may have been impaired by the accidental changes that have recently taken place in the climate through the great destruction of forests.

Much of the land now under coffee in Coorg is very ill-suited for the purpose, it being so steep that no care or ingenuity can prevent the surface soil from being washed away. Two or three monsoons are, in general, sufficient to sweep off every trace of *humus*, and the plants then get down on the cold hungry subsoil, which consists chiefly of clay, decaying gneiss and kaolin, and is notoriously deficient in lime, phosphates, and other elements, without which coffee cannot live and produce remunerative crops. Owing to this and the exhausting effects of

fruiting, plants on estates which have been five or more years in existence, have, as a rule, a very sickly look, and, under the present system of culture, must have speedily disappointed the hopes of their proprietors, although the Borer had never made its appearance. On most estates, too, the system of pruning is improper, and has been the chief cause in inducing a disease called *rot*. This distemper makes its appearance during the rains, when the plants are saturated with moisture, and attacks the leaves, many of which turn black and fall off. Whenever the leaves drop, the berries near their insertion also fall down, and, in this way, as much as one or one and a half bushel per acre of crop may be lost. The immediate cause of the disease seems to be the overcrowding of the branches, which prevents the necessary exposure of the leaves, &c., to light and air, and so retards perspiration, assimilation, and the due ripening of wood in the stem and primaries. In some plants affected with rot, I have found the centres of the stems in a state of decay, brought on, no doubt, by the complete stagnation of the circulation. The quantity of weeds allowed to grow on some estates is also most prejudicial to the coffee, and the practice of piling them round the base of the stem when uprooted, highly objectionable. Every English gardener knows how much the gooseberry bushes in a neglected garden suffer from caterpillar, and there is every reason to suppose that a foul coffee estate is equally inviting to the Borer. These several causes, then, have greatly lowered the vital powers of the coffee-plant in Coorg, and helped to render it a ready and easy prey to the Borer.

Other depressing agencies arose in the droughts of past years, which not only acted most detrimentally on the coffee, but also appear to have produced a peculiar state of the atmosphere, highly favourable for the development of its insect enemies. Throughout the whole of Western Mysore and Coorg, the abundance of wood-destroying insects has, during the past year, been such as to attract general notice, and plants of all kinds, from the jack to the bamboo, seem to have suffered from their ravages. The common opinion is that their appearance in such numbers is an effect of the drought, and this would seem to be the correct one, as there was no other general appreciable cause in operation, and because the explanation is consistent with established facts regarding the influence of atmospheric conditions on insect

life. Throughout the whole of 1866, then, the coffee in Coorg was generally in a sickly condition, partly from the effect of causes already referred to, and partly from those of the droughts. At the beginning of the present year, too, the amount ef blossom put forth by the coffee was such as had never before been seen by the oldest planter, and, although looked upon by many as a propitious sign, it was doubtless but a symptom of the feeble condition of the plant; as it is a well-known fact that plants in a sickly condition often produce an unusual number of flowers. No doubt, this effort on the part of the coffee still further reduced its powers, as no phenomenon of plant life is more exhaustive in its effects. Altogether, therefore, the coffee-plant in Coorg has for some time been in such a weakly state as would render it peculiarly liable to disease, and during the past twelve months, the White Borer has found in it a highly congenial field, in which to live and multiply. I shall say nothing of the Red Borer, as, confining itself chiefly to tender branches, it is not nearly so destructive in its operations as the other one, and, besides, it has never appeared in great numbers. For the last few years, occasional specimens of the White Borer have been observed by planters, but it is only of late that they have appeared in such numbers as to cause alarm. At the present moment, I do not believe that there is an estate in Coorg free from the pest, while one at least has been rendered worthless, and many more will be in nearly the same condition before the advent of the rains in 1868. In fact, this branch of industry is threatenod with complete extinction, and it is very humiliating to think that the cause is a tiny insect, of which a man could crush a thousand between his palms. To enter into the natural history of the insect, were the facts at my disposal sufficient to enable me to do so satisfactorily, which they are not, would, in my opinion, be of little avail, as remedial measures, to be successful, must be directed against the causes that have favoured the production and increase of the insect, rather than against the creature itself. Indeed, at first, the operations of the enemy are so insidious, that it is generally impossible to say whether a tree has been attacked or not, and it is only when the work of destruction has gone beyond all remedy that symptoms of what has happened become manifest. The signs of Borers being in a tree are drooping of the younger leaves, and, ultimately, a yellow colour in the

whole of the foliage. In advanced stages, the leaves drop off, and, after a few abortive attempts to put forth fresh buds, the plant withers and dies. After the leaves have become yellow, a very slight force will break the stem across, when the tunnels of the enemy, accurately filled with the *débris* of the wood in a fine state of division, will be observed. These are generally about the diameter of a small quill, and are always confined to the wood, never entering the bark until the larva has done its work, passed through the pupa stage, and is about to escape in the form of a beetle. It is the larva of the insect that is called the Borer, and which proves so destructive in its habits. The eggs from which it is developed would appear to be deposited immediately under the bark of a plant near the ground, by means of a telescopic-looking strong ovipositor, with which the abdomen of the female beetle is furnished. It has not been ascertained whether, in performing this operation, she takes advantage of one of the numerous cracks in the outer bark, but it is probable that such is the case; as, by so doing, she would, without difficulty, reach the tender inner layers which the ovipositor would easily penetrate, and thus place the germs of her future progeny in contact with the mucilaginous *cambium* which would supply them with nutriment, until they acquired sufficient strength to commence tunnelling operations in the wood. The tunnel made by the young Borer is but small (about the diameter of a netting needle), and entirely confined to the sapwood. It does not continue long of that size, however, but gradually gets larger as the insect increases in bulk and strength, and then the hard central wood of the stem is attacked. As the Borer works into the stem, it seals up the passage behind it with the *débris* of the wood, so firmly agglutinated by some mucilaginous fluid that it can be removed like a cast of plaster of Paris on laying open the tunnel. This occlusion seems to be necessary for the existence of the larvæ, for, on laying some of them bare, with the view of watching operations, exposure to light and dry air speedily proved fatal. A considerable number of Borers are generally found in one stem, but, although their passages are very intricate and eccentric in their course, the tunnel of one very rarely communicates with that of another. Roots are just as frequently destroyed by them as stems, the larvæ travelling downwards; and when the wood of the stem has become nearly exhausted, they

frequently strike off into branches. The full grown Borer or larva is generally from three-quarters to one inch in length, and about the diameter of a quill at the head. The body is whitish, soft, ringed, destitute of feet, thickest in front, and tapers gradually toward the blunt posterior extremity. The head is harder than the body, and furnished with very powerful mandibles. When the larva has completed its term of existence, during the whole of which its entire energy is expended on feeding, it approaches the surface of the stem, and, passing into a state of inactivity, becomes a pupa. How long it remains in this state is doubtful, and all that we know with certainty is that the imago is produced in a cavern prepared for it by the larva in the sapwood, or immediately under the bark, and that, having got through the process of exuviation, it cuts its way out in the shape of a perfect beetle. Instead of living in a dark hermetically-closed tunnel, it now exists in light and air, soaring on wing, or jumping with its powerful legs. It is at this time about half an inch in length, or sometimes a little more. The head is small, depressed, and furnished with robust mandibles, tapering antennæ, and large brilliant reniform eyes. The elytra are black, and each is marked with three oblique greenish bands, meeting in pairs at their inner extremities when the wing-cases are folded, and by a diagonal one at the upper end. The hind-legs are long and powerful, and the basal joints of their tarsi are furnished beneath with brush-like appendages. The insect belongs to the tetramerous family of Coleoptera or beetles, and will doubtless be soon in the hands of English Entomologists, able to identify it, and give a full account of its natural history. We have as yet no reliable information regarding the periods of the year at which the insect is to be found in its various stages of development. In the trees examined by me in September, I found only larvæ. Probably the beetle or perfect insect emerges in the dry season, or earlier months of the year, as it would hardly be possible for it to live during the heavy rains of the monsoon. The Borer does not attack dead stems.

It will be observed that, through the whole of this letter, I have endeavoured to show that the coffee-plant in Coorg has been subjected to various debilitating influences, which have predisposed it to disease, and I now wish to say that I look upon the Borer as akin to an epidemic. Change in the climate, impoverished soil, and

bad cultivation reduced the vital powers of the plant to a minimum, and the severe drought of past years then furnished the special influence that caused the pest to increase to such an extent. There is no other rational method of accounting for a scourge that has appeared simultaneously in so many districts so far removed from each other, and under such varying circumstances. At the same time, there is no doubt that, when once the disease has appeared on an estate, it will not confine itself to sickly plants, but, when these have been used up, extend its ravages to the most vigorous and healthy. That a general debility in the coffee-plant has been a powerful predisposing cause is, I think, sufficiently evident from the following considerations :—

(*a.*) Plants purposely or accidentally manured (such as those around coolie lines), and thus in vigorous health, rarely suffer much from Borer, while others in the immediate neighbourhood, in which this condition is absent, suffer severely.

(*b.*) Plants on newly opened estates, in which the soil has not been exhausted, escape entirely, or suffer but slightly.

(*c.*) Plants on dry, barren, and exposed ridges suffer soonest and most severely. Shade does not appear to protect plants from Borer in Coorg, and, although it did, the climate of a great portion of the district is such as to render its use impracticable, the shutting out of light and air by it during the rains, when the plants and atmosphere are saturated with moisture, and the heavy drip rendering the coffee sickly and unproductive. In bamboo lands, and places where the monsoon is less heavy, however, it may prove useful. I may mention one curious and suggestive fact regarding shade that was brought to my notice by a planter. When shade was talked of some time ago, he tried an experiment on a small portion of the estate with the charcoal-tree (*Sponia Wightii*) to afford shade, and the result was that the charcoal-tree was riddled with Borer, while the coffee escaped entirely. This result would seem to support a proposition, enunciated by the late Inspector General Macpherson, who had given great attention to coffee culture, viz., ‘ that the Borer had attacked the coffee because the trees in which it used to live in the jungle had been cut down.’ It is quite possible there may be some truth in this, but, at all events, the rearing of belts of the charcoal-tree on estates, so as to afford shelter

from dry and scorching winds, and give the Borer a less expensive food than the coffee-tree, seems deserving of a trial. Farmers and gardeners at home are quite familiar with expedients of this kind for getting rid of the larvæ of insects destructive of fruit-trees or crops. I examined the Borer found in the charcoal-tree, and it seemed identical with the coffee one. As I have hinted already, it seems perfectly futile to attempt to stop the increase of, or to extirpate, the Borer by doctoring individual trees, and the truth of this will become apparent when we consider for a moment that every acre on an estate contains an average from 1800 to 2000 plants, and that the larvæ live in the interior of the stem. On the other hand, there cannot be a doubt that the complete destruction by fire of every coffee-shrub infested with Borer is a most essential preventive measure, as every Borer permitted to live may produce a beetle, and every female beetle may deposit at least 200 eggs. For *stamping-out* measures of this nature, some combination amongst planters is highly desirable, as a *bored* estate, in which such means are neglected, will prove a source of danger to others in its neighbourhood. I think, however, that the efforts of the planter should chiefly be directed towards the introduction of a superior mode of cultivation, so as to get the plants into better condition."

Dr. Bidie has since been appointed by the Madras Government a Special Commissioner for investigating the ravages of the Borer in Mysore and Madras. I am indebted to Mr. Daniel Hanbury for the following extracts.

(*Extracts from a letter of Dr.* George Bidie, *dated* Veerajpettah, (*Coorg*), 21 *Dec.* 1867.)

"In the little kingdom of Coorg two or three coffee estates have been almost entirely cleared of their trees by the Borer; some have lost from 8 to 50 per cent., and none on which the plants are upwards of three years old, have escaped entirely. Plants less than three years old are rarely attacked, and the older the tree the more liable is it to suffer. The eggs of the insect are deposited in cracks of the bark on the stem, from 3 to 18 inches above the surface of the ground. When hatched, the little larva works in the *cambium* until it has strength

to enter the wood, and by so doing occasions a small ridge on the bark, which is a sure sign of Borer being in the tree. Once in the wood, it tunnels in all directions, now going up, now down, or proceeding in corkscrew fashion. As it works its way, it seals up the passage behind it with the *débris* of the wood in a fine state of division, but so firmly agglutinated by some mucilaginous fluid, that it can be removed out of the tunnel like a cast of plaster of Paris. As a rule there is more than one larva in a tree, and I have found as many as twelve in a single stem. Very often the Borer also tunnels the roots of the tree, but it almost uniformly returns again to the stem, having completed its work of destruction below ground. After living for some months in the larva state, the Borer approaches the surface of the stem, where, having prepared a small chamber, it passes into the pupa state; this chamber is usually situated in the sapwood, but I have often seen it in the very centre of the stems. In a few weeks the perfect beetle eats its way out, and the hole thus made is the first one visible on the exterior of the tree. The beetle thereafter lives entirely in the open air, resting by night, and becoming active in the sunshine. The larva, pupa, and beetle are to be found in every month of the year, and all three forms may frequently be seen simultaneously in a single tree. This, and the circumstance of the larva and pupa living in the interior of the tree, render it very difficult to devise any means for the destruction of the pest. I have been recommending the uprooting and destruction by fire of trees as soon as they exhibit any signs of the insect being in the interior, and the coating of the lower part of the stems of young trees with coal-tar, so as to prevent the deposition of eggs . . . . . My time is now chiefly occupied in estimating the damage done by the Borer, and during the last month I have on an average been from 8 to 10 hours daily in the saddle, and have thus little time left to extend and arrange my rough notes."

Mr. Richter is in error in supposing the Borer-beetle to be a *Cucujus;* it is an unmistakeable *Clytus,* or rather it belongs to that group of the old genus which M. Chevrolat has recently separated under the name of *Xylotrechus,* and is the *Xylotrechus quadripes* of that author, described in the "Clytides d'Asie et d'Océanie" (Mém.

Soc. Roy. des Sci. de Liége, xvii. p. 63). A single specimen is in M. Chevrolat's collection, now in the British Museum; and so far as I can learn, this species was known in Europe only by that solitary individual, until attention was pointedly called to it by the serious injury done to the coffee plantations of Southern India in 1867.

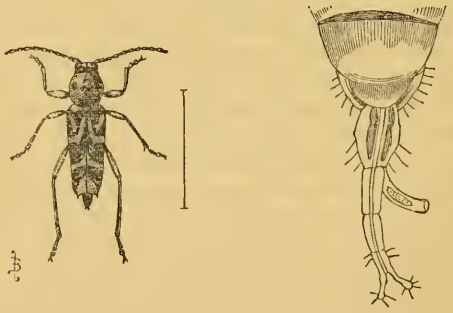
Fam. CERAMBYCIDÆ, Div. CLYTINÆ.

Gen. XYLOTRECHUS, Chevr. Ann. Soc. Ent. Fr. 1860, p. 456.
„ Mém. Soc. Sci. Liége, 1863, p. 59.

XYLOTRECHUS QUADRIPES.

Xylotrechus quadripes, Chevr. Mém. Soc. Sci. Liége, xvii. 63 (1863).

Cucujus coffeophagus, Richter, Proc. Agri-Hort. Soc. Madras, 1867.



The facial carinæ of this insect seem to point to *Xylotrechus*, but the globose prothorax is more characteristic of *Anthoboscus*, *Chlorophorus*, or *Sphegesthes*. In the absence of the type-specimen, for comparison with those sent by Mr. Richter and Dr. Bidie, and judging from description only, I should have referred the beetle to *Anthoboscus* (*Clytanthus*, Thoms.). The specific description given by M. Chevrolat is sufficiently accurate, and indicates the *Clytus vicinus* of Laporte and Gory as a near ally of *quadripes*. The specimens received from Coorg are pretty constant in colour and marking, but vary in size, the males ranging from 5-7 lines, and the females from 6-8 lines in length.

The figure of the ovipositor, as seen under continued pressure of the abdomen, has been reduced from a magnified drawing which was kindly sent me by the Rev. G.

Richter. The projection on the right hand side would seem to be a portion either of the alimentary canal, or of the ovary-duct, which has been forced through a fracture of the ovipositor.

I may perhaps be allowed to say a few words with respect to the recent sub-division of the old genus *Clytus*, and will confine myself to the period since 1860, and to the group of *Clytinæ* most nearly allied to the now notorious coffee-borer.

In the "Description d'Espèces de *Clytus* propres au Mexique" (Ann. Soc. Ent. Fr. 1860, p. 455) M. Chevrolat divided *Clytus* into eleven groups or divisions, the fourth, fifth, and seventh, of which he called respectively *Anthoboscus*, *Clytus* (true), and *Xylotrechus*. The type species of *Anthoboscus* was the Mexican *tricolor*, Chevr., and to this division were also referred the European *Massiliensis* of Linnæus, and *plebeius*, *trifasciatus*, and *ornatus* of Fabricius. In *Clytus* (true) were retained *arietis*, Lin., *rhamni*, Germ., and *lama*, Muls., &c. The type of *Xylotrechus* was again a Mexican species, *Sartorii*, Chevr., but the European *Hafniensis*, Fab. (=*liciatus*, Lin.), *arvicola*, Oliv., and *antilope*, Ill., and numerous Asiatic species, were indicated as belonging to this division.

In the same year (1860) Mr. James Thomson published his "Essai d'une Classification de la Famille des Cérambycides," in which most of the "divisions" of M. Chevrolat are raised to generic rank, and other new genera are propounded. *Clytus* (p. 217) is restricted to the group of which the *robiniæ* of Forster is taken as the type. *Anthoboscus* (p. 219) is restricted to the Mexican species indicated by M. Chevrolat, and is said to be scarcely distinct from *Plagionotus*. *Xylotrechus* is extended to comprise three divisions; the first containing *Sartorii* and its allies; the second (named *Europa*, and afterwards *Clytumnus*) containing *Massiliensis*, *plebeius*, *trifasciatus*, *ornatus*, *arietis*, *rhamni*, *arvicola*, *antilope*, and also the *floralis* and *annularis* of Fabricius; the third containing the *semipunctatus* of Fabricius and the *perspicillus* of Fischer (= *comptus*, Mannerheim).

In 1862-63, M. Mulsant published a new edition of his "Longicornes de France," in which he divided "Les Clytaires" into three genera, *Plagionotus*, *Clytus*, and *Anaglyptus*, and again divided *Clytus* (p. 143) into five sub-genera, *Echinocerus*, *Xylotrechus*, *Clytus*, *Anthoboscus*, and *Isotomus*. *Echinocerus* is represented by *floralis*; *Xylotrechus* includes *liciatus*, *arvicola*, and *antilope*;

Clytus includes *lama, arietis,* and *rhamni; Anthoboscus* includes *trifasciatus, plebeius,* and *Massiliensis;* whilst *Isotomus* is composed of *semipunctatus* and *comptus.*

In 1863 M. Chevrolat's "Clytides d'Asie et d'Océanie" appeared. Amongst other new genera, *Chlorophorus* (p. 38) is proposed for *annularis* and its allies. *Anthoboscus* (now a genus) includes *ornatus, Macaonensis,* plebeius, perspicillus,* and numerous other species. *Clytus* includes *floralis. Xylotrechus* (now also a genus) is divided into nine divisions, the third of which is sub-divided into three groups; amongst the 27 Asiatic or Oceanic species enumerated are *quadripes, vicinus,* Lap. & Gory, and *ibex,* Humm. (said to be allied to *arvicola*). At p. 81, the genus *Sphegesthes* is founded, and *arietis, rhamni, lama* and *arvicola* are referred to it, together with the *capra* of Germar.

Lastly, the "Systema Cerambycidarum" of Mr. James Thomson was published in 1864. In this work the author abandons the limits of *Clytus* and *Xylotrechus* as defined in the "Essai" of 1860. The original limits of *Clytus* as defined by Von Laicharting in 1784 are now adopted, (p. 186), *arietis* is re-instated as the type-species, and *Europa* (=2nd div. of *Xylotrechus,* Thoms. 1860), *Sphegesthes,* and *Echinocerus,* are sunk as synonyms. *Anthoboscus, Chlorophorus,* and *Isotomus* (=3rd div. of *Xylotrechus,* Thoms. 1860), are merged to form the genus *Clytanthus* (p. 190), the names *Anthoboscus* and *Chlorophorus* being rejected on account of their having been already employed for genera of insects, whilst *Isotomus* is discarded as being a "nom trop voisin de celui d'*Isosomus*;" † the type-species of *Clytanthus* being *tricolor,* the original

* This species was first described by M. Chevrolat, at p. 98 of the Rév. Zool. 1845, in a paper entitled "Description de dix Coléoptères de Chine des environs de *Macao.*" By a typographical error the name is there printed *Macaumensis;* and by a second error, the insect appears in the "Clytides d'Asie" (p. 45) as *Anthoboscus Macaunensis.*

† See a note by Mr. Pascoe "On generic Names having nearly the same Sound," in Proc. Ent. Soc. 1865, p. 85, in which it is stated that Mr. James Thomson had previously changed the name *Orthostoma* because of its supposed resemblance to *Orthosoma.* I can only suppose that Mr. Thomson is in the habit of speaking of *Orthostŏma* and *Isosŏmus!* But if the derivation of the names be attended to, there is no very great fear of confusion between *Orthostŏma* and *Orthosōma,* or between *Isotŏmus* and *Isosōmus.* A better reason for the rejection of *Isotomus* would have been the fact that the same name has been applied to a genus of plants; but according to modern notions this is an insufficient ground, and botanists have now ceased to discard names pre-occupied by zoologists. Zoologists however will do well to avoid the intentional use of generic names already employed by botanists. *Factum valet, fieri non debet.*

type of *Anthoboscus*. Lastly, *Xylotrechus* (p. 190) is again reduced to its original dimensions, with *X. Sartorii* for its type, as defined by Chevrolat in 1860.

It is not very clear, even now, where Mr. Thomson draws the line between *Clytus* and *Clytanthus*. *Europa*, Thoms., is given as a synonym of *Clytus*, and *Anthoboscus*, Chevr., as a synonym of *Clytanthus*. But this cannot be more than approximately true; *Europa* included *annularis*, the type of *Chlorophorus*, which is merged in *Clytanthus*; and there are various species—*e. g.*, *ornatus* and *plebeius*—placed by Thomson in *Europa*, which by Chevrolat were placed in *Anthoboscus*. I understand *Clytus* (Thoms. 1864) to include the whole of *Europa* (Thoms. 1860), with the exception of *Chlorophorus* (Chev. 1863). If this be not Mr. Thomson's meaning, he has omitted to show which of the species of his *Europa* belong to *Clytus* and which to *Clytanthus*.

At the risk of a little repetition, I will exhibit in a tabular form the changes in generic nomenclature made by the above-mentioned authors within a period of five years, as they affect the half-dozen species which have so long been known by the names given in the left-hand column :—

Clytus arietis, Lin.	= *Clytus* (div. *Clytus*) *arietis*, Chevr. 1860.
	= *Xylotrechus* (div. *Europa*) *arietis*, Thoms. 1860.
	= *Clytus* (subg. *Clytus*) *arietis*, Muls. 1862.
	= *Sphegesthes arietis*, Chevr. 1863.
	= *Clytus arietis*, Thoms. 1864.
Clytus arvicola, Oliv.	= *Clytus* (div. *Xylotrechus*) *arvicola*, Chevr. 1860.
	= *Xylotrechus* (div. *Europa*) *arvicola*, Thoms. 1860.
	= *Clytus* (subg. *Xylotrechus*) *arvicola*, Muls. 1862.
	= *Sphegesthes arvicola*, Chevr. 1863.
	= *Clytus arvicola*, Thoms. 1864.
Clytus plebeius, Fab.	= *Clytus* (div. *Anthoboscus*) *plebeius*, Chevr. 1860.
	= *Xylotrechus* (div. *Europa*) *plebeius*, Thoms. 1860.
	= *Clytus* (subg. *Anthoboscus*) *plebeius*, Muls. 1862.

Clytus plebeius, Fab. = *Anthoboscus plebeius*, Chevr. 1863.
= *Clytus plebeius*, Thoms. 1864.

Clytus floralis, Pallas = *Xylotrechus* (div. *Europa*) *floralis*, Thoms. 1860.
= *Clytus* (subg. *Echinocerus*) *floralis*, Muls. 1862.
= *Clytus floralis*, Chevr. 1863, and Thoms. 1864.

Clytus ruficornis, Oliv. = *Xylotrechus* (div. *Europa*) *ruficornis*, Thoms. 1860.
= *Clytus* (subg. *Anthoboscus*) *ruficornis*, Muls. 1862.
= *Clytus ruficornis*, Thoms. 1864.

Clytus annularis, Fab. = *Xylotrechus* (div. *Europa*) *annularis*, Thoms. 1860.
= *Chlorophorus annularis*, Chev. 1863.
= *Clytanthus annularis*, Thoms. 1864.

Clytus comptus, Mann. (= *perspicillus*, Fisch.) = *Xylotrechus* (div. 3) *perspicillus*, Thoms. 1860.
= *Clytus* (subg. *Isotomus*) *comptus*, Muls. 1862.
= *Anthoboscus perspicillum*, Chevr. 1863.
= *Clytanthus perspicillus*, Thoms. 1864.

Mr. Pascoe, though at first disinclined to sanction the dismemberment of *Clytus* (see Journ. of Entom. i. 360), recognizes *Xylotrechus* and *Clytanthus* as genera, but holds (I believe) that if the old genus is to be broken up, the subdivision must be carried further than has yet been done; and that if any of these groups are to be separated from *Clytus*, the *Anthoboscus* group and the *Chlorophorus* group should be separated from each other.

It would seem that the only point upon which Messrs. Chevrolat, Mulsant, Thomson, and Pascoe are agreed is this—that the old genus *Clytus* has become so unwieldy as to require the formation at its expense of several genera; but it is sufficiently apparent from what precedes that each of these authorities differs from every other of them as to the limits of the groups to be separated, and the contents of the genera to be formed.

I confess my inability to appreciate, as of generic value, the minute distinctions upon which some of the above-mentioned off-casts from *Clytus* are founded, and

I cordially agree with Mr. Thomson both when he sinks *Sphegesthes* and replaces *arietis* as the type-species of *Clytus*, and also when he re-unites *Anthoboscus*, *Chlorophorus*, and *Isotomus*. An author who has created Cerambycide genera by the hundred * is not likely to err on the side of too great sternness in refusing recognition to the creation of others.

If I have rightly understood Mr. James Thomson, the three genera *Clytus*, *Clytanthus*, and *Xylotrechus* stand as follows: †—

Gen. Clytus.

Clytus, Laich. Tyr. Ins. ii. 88 (1784); *nec al. auct.*
> *Clytus*, Thoms. Essai, p. 217 (1860).
> *Europa* = } = *Xylotrechus* (2nd div.), Thoms. Essai,
> *Clytumnus* } p. 221 (1860); (*nec Xylotrechus*, Chevr., Muls.).
> *Echinocerus*, Muls. Longic. de France, p. 143 (1862).
> *Sphegesthes*, Chevr. Clyt. d'Asie, p. 81 (1863).
= *Clytus*, Thoms. Syst. Ceramb. pp. 186, 424 (1864).
Type.—*C. arietis*, Lin.

Gen. Clytanthus.

Clytanthus, J. Thoms. Syst. Ceramb. p. 190 (1864).
< *Clytus*, Fab., Lap. & G., *et al.*
> *Anthoboscus*, Chevr. Ann. Soc. Ent. Fr. 1860, p. 455.
> *Xylotrechus* (3rd div.), Thoms. Essai, p. 221 (1860); *nec* Chevr., Muls.
> *Isotomus*, Muls. Longic. de France, p. 183 (1862).
> *Chlorophorus*, Chevr. Mém. Soc. Sci. de Liége, 1863, p. 38.
Type.—*C. tricolor*, Chevr.

Other species belonging to this genus are *annularis*, Fab., *bidens*, Fab., *comptus*, Mannerh., *semipunctatus*, Fab., *Macaonensis*, Chevr., &c.

* "Le *Systema Cerambycidarum* en a fait connaitre 1178 genres, dont *plus d'un tiers* sont de ma création." (J. Thoms. Syst. Ceramb. p. 497).

† The sign = has been long used to denote that two names are synonymous. I venture to adopt (from the Transactions of an American Society) the user of the algebraical signs > (greater than) and < (less than), for the purpose of showing which is the major and which the minor group, when the names are not perfectly synonymous, but belong to groups which are not co-extensive. Thus *Clytanthus* < *Clytus* shows that *Clytanthus* is less extensive than and was included in *Clytus*; whilst *Clytanthus* > *Chlorophorus* shows that *Clytanthus* is more extensive than and includes *Chlorophorus*.

Gen. Xylotrechus.

Xylotrechus, Chevr. Ann. Soc. Ent. Fr. 1860, p. 456; Clyt. d'Asie, p. 59 (1863).
< *Clytus*, Fab., Lap. & G., *et al.*
= *Xylotrechus* (1st div.), Thoms. Essai, p. 221 (1860).
= *Xylotrechus*, Thoms. Syst. Ceramb. pp. 190, 424 (1864).
Type.—*X. Sartorii*, Chevr.

Other species belonging to this genus are *liciatus*, Lin., *Chinensis*, Chevr., *vicinus*, Lap. & G., *quadripes*, Chevr., *ocellatus*, L. & G., &c.

The diagnostic characters given by Mr. Thomson (Syst. Ceramb. p. 424) are as follows :—

Clytus. *Antennæ* breves, artic. 3° seq. longiore.
Prothorax subglobosus, oblongus.
Pedes postici elongati, ♂ femora postica corpus transientia.

Clytanthus. *Antennæ* graciles, breve, artic. 3° seq. longiore.
Prothoraæ rotundatus.
Elytra apice truncata.
Prost. append. angusta; *mesost.* append. lata.
Corpus elongatum, angustatum.

Xylotrechus. *Frons* plus minusve *longitud. carinata.*
Antennæ breves, artic. 3° seq. longiore.
Prothoraæ subovalis.
Elytra paulò brevia.
Prost. append. angusta; *mesost.* append. lata.
Pedes postici elongati.

When it is borne in mind that Mr. Thomson has another genus, *Clytosaurus*, which comes between *Clytanthus* and *Xylotrechus*, it will be seen how very slight are the differences which separate these various groups.

The only conclusion at which I arrive with certainty is this—that there is still much to be done with this group of *Clytinæ* before their classification can be deemed satisfactory. M. Chevrolat appears to me to have failed to give any distinct characters by which his *Anthoboscus*, *Clytus* (true), *Xylotrechus*, *Chlorophorus*, and *Sphegesthes* can be discriminated; and whilst grateful for the reduction of these five groups into three, and for the merger of M. Mulsant's *Echinocerus* and *Isotomus*, I cannot but feel that Mr. James Thomson has left us in obscurity as to the real boundaries of *Clytus*, *Clytanthus*, and *Xylotrechus*.

VI. *Observations on the Economy of Brazilian Insects, chiefly* Hymenoptera, *from the Notes of Mr. Peckolt.* By Frederick Smith, late Pres. Ent. Soc.

[Read 3rd February, 1868.]

At the September meeting of this Society in 1866, I communicated some highly interesting notes by Mr. Peckolt, of Cantagallo, in Brazil, on the economy of various species of Aculeate *Hymenoptera*; these having proved of sufficient interest to furnish a short paper, subsequently printed in our Transactions [Tr. Ent. Soc. third series, vol. v. p. 323], my correspondent has forwarded a second collection, accompanied by notes on the economy of the various species.

In the paper alluded to, I described, I believe for the first time, a female of one of the stingless honey-bees, the *Trigona Mosquito;* Mr. Peckolt forwarded a small colony of this bee, together with the nest, and I succeeded in discovering among them a single gravid female, as well as five others of the same sex, which I believe to have been virgin queens, their abdomens not being distended as that of the old queen was; this circumstance induced me to hazard a conjecture as to the probability of these bees swarming in the same manner as *Apis mellifica*. Mr. Peckolt now writes as follows:—"Your conjecture respecting the swarming of *Trigona Mosquito* is now confirmed; I made inquiry of several people, who told me they had observed the swarming of these bees, but I had never done so myself. I have, therefore, in consequence of your notice, obtained hives of three or four species, which I have established in my garden. I have also searched six separate hives, to see whether there was more than one female in each,—that is, one that was impregnated; and from your description, I had no difficulty in recognizing the queen; but I never could find more than one. I have now in my garden, one hive of *Trigona Mosquito*, one of *Trigona ruficrus*, one of *Trigona Mandacaia*, and one of *Trigona Urucu*. I very frequently watch them during the day, and have observed *Trigona ruficrus* swarm, just like the European honey-bees. This I have done about the end of March, when the cold time begins, whilst in April, May, June and July, they appear to increase very scantily, I suppose in order

not to raise too many useless feeders. The first swarming that I observed occurred during a thunder-storm. A great number left their hive, with their queen, just as I have seen the honey-bee *Apis mellifica*, and indeed their mode of life appears to be almost identical."

The value of these observations will be appreciated by every Entomologist, since, taken in conjunction with those published in my former paper on the stingless honey-bees, we have now acquired almost a complete history of their economy. In Mr. Peckolt's notes on different species, we find the observations of former naturalists fully corroborated; he says, some construct their nests in hollow trees, some in the ground, whilst others construct suspended nests of clay on trees and bushes. The quality of the honey varies considerably in the different species; of one it is said to be very good, that of another tolerably so, of another it is poor and rather tasteless, whilst that of some is said to be unpalatable.

With regard to the different modes of building, we are prepared to expect such to be the case; having examined the mandibles of a large number of species, I have found some which have those organs finely denticulate on their inner margin, others with only five or six strong teeth, whilst many species have the mandibles edentate. The quality of the honey will, of course, depend upon the flowers from which the bees extract it. The honey collected by the hive-bee in this country differs in quality according to the district in which it is obtained by the bees: I have been informed that honey from some of the districts in Hampshire is perhaps the finest of all; this is said to be attributable to the extensive heaths, covered with *Erica*, from which the bees obtain the honey. Many of our solitary bees are rarely observed to visit any but particular flowers, and probably such is the case with different species of the genus *Trigona*.

The observations on various solitary *Hymenoptera* are also interesting; the following are the most so: I have retained the local names given by Mr. Peckolt, and have, when possible, added the scientific one also.

Trigona Jatai. This species produces a very fine kind of honey.

Trigona basalis. This is called dog-bee, or earth-bee, because it makes its nest in the ground, not in trees like *Trigona ruficrus*.

Trigona Cupira is an earth-bee, and makes good honey.

"Marimbouda amarella" is *Pelopœus fistularis* of Dahlbom, a house-wasp; it makes a clay nest, and stores it with spiders.

"Marimbouda da Casa" is *Trypoxylon albitarse;* it makes a clay nest in the form of a long cylinder; it is called the "house-wasp" because it builds its nest especially in rooms, but also out of doors on the vine, &c.; there are from four to six divisions, and in each cell is laid one egg; the cell is filled with some kind of spider, and hermetically sealed; it is curious that precisely the required number of spiders is stored up, just sufficient to perfect the wasp, since none are ever found after the insect eats its way out of its earthen cell.

"Bisurra amarella pignena" is the *Centris ferruginea* of St. Fargeau; it makes its nest in the ground, and is very spiteful and vicious.

"Bisurra amarella grande" is the *Centris fuscata* of St. Fargeau.

"Marimbouda de cachorro" is the *Sphex fulvipennis*; it constructs its nest under ground.

"Marimbouda accii" is a large species of the genus *Pepsis;* it is the enemy of the large bush-spider; it is astonishing to see this insect attack the uncouth spider, ten times as large as itself, and overpower it; but it is always the victor.

"Marimbouda tatu" is *Chartergus apicalis;* it is said to be a very furious wasp; its nest is built on trees, and if in any way disturbed, a swarm of the wasps rush furiously to the attack.

"Marimbouda preta da bunda" is *Liogastra bicolor* of Perty; this bee is described as a very furious *wasp,* and is said to be very widely spread over the country.

The collection contained a few insects of other Orders. Among the *Diptera,* there is one which is called the "Warega" fly. This is said to be the pest of both man and animals; it is a species of *Musca,* and is said to lay its eggs in the skin; large and terrible swellings are formed; the mode of extracting the maggot is to cut an opening, and to press it out,—a most painful operation; these wounds are very difficult to cure.

Another dipterous insect is called the "Berna" fly, which deposits its eggs in wounds, both on man and beast; it is a species of the genus *Trypeta,* and is remarkable from having the apical segment of the abdo-

men elongated into a long ovipositor; Mr. Peckolt says the negroes suffer much from the attacks of this fly, which frequently deposits its eggs in their nostrils whilst they are sleeping, and such are the effects of its attacks, that, in some cases, death ensues.

Another dipterous insect is called "Marimbouda santa," the holy wasp, having, as the people say, a priest's coat; the insect is a species of the genus *Sargus*, and is distinguished by having a yellow cross at the base of the abdomen.

Mr. Peckolt has also sent a phial containing a specimen of a caterpillar, that lives in companies of from thirty to forty; they spin together a large cocoon, as big as a man's head, in which they undergo their change. This caterpillar is ornamented with a number of fringed spines or branches, and is very destructive to various shrubs. It probably belongs to some species of butterfly. [See Proc. Ent. Soc. 1868, p. xv.]

VII. *A few Observations on the Synonymy of* Tinea (?) alpicella, *and* Zelleria saxifragæ, (n. sp.). By H. T. Stainton, F.R.S., V.P. Ent. Soc., &c.

[Read 17th February, 1868.]

In the collection of European *Micro-Lepidoptera* received from Herr Mann, of Vienna, in 1849, were two specimens of an insect sent as *Œcophora alpicella*, F. v. R. Believing this to be then undescribed, I gave the following brief description of it in the Appendix to my Supplementary Catalogue, published in 1851—thus, at p. 18 :—

"Tinea alpicella (*Œcophora! alpicella*, (F.v.R.), Mann *in litt.*). Perhaps hardly a true *Tinea*, the palpi too long and slender; anterior wings white, with some fuscous scales along the subcostal and subdorsal nervures, and the nervures at the apex of the wing also marked with dark scales; on the disk before the middle of the wing is an oblique pale fuscous streak, and a spot of the same colour at the end of the discoidal cell; cilia white, with some black and fuscous scales towards the apex. Exp. 7 lines."

From better-marked specimens I now see that I might have added, that the oblique pale fuscous streak before the middle is continued along the fold to the base of the wing.

In the same year, Herrich-Schäffer figured the same insect as *Alpicella*, No. 359;—the oblique streak *before* the middle and the breadth of the anterior wings clearly represent the above-mentioned insect.

The letter-press treating of the insect figured did not appear till 1855, and by that time Dr. Herrich-Schäffer had become acquainted with another insect, which, though generically quite distinct, he confused with the original *alpicella*, apparently reputing it the female. At the commencement of his description, vol. v., p. 282, he says :—"On the anterior wings are *ill-defined pale brown spots*, a longer one in the medial longitudinal line *before* the middle, obliquely below it *more to the base one in the fold*, and one *beyond it* at two-thirds of the length of the wing." All this, especially the characters printed it italics, points conclusively to the species figured in his work and described in my Supplementary Catalogue.

But he then proceeds—"Quite fresh female specimens, which Professor Frey took in the Engadine, at a height of 5200 feet, are distinguished by their wings being *much narrower*, and the anterior are *milk white*, with coarse black dots, which are placed in four irregular longitudinal rows, the oblique fascia *in* the middle is *blacker, more defined, and is prolonged as a brown shade in the apex of the wing*." Here all the characters italicised point to a new species, and strangely enough, when speaking of the palpi, Herrich-Schäffer remarks, "in the female the third joint of the palpi is rather club-shaped, *as in the genus Zelleria*," and was thus on the very point of discovering that the two insects were generically distinct.

In 1856 Herrich-Schäffer figured in his Neue Schmetterlinge, Heft I. fig. 45—as "a very distinctly marked female of *Swammerdamia alpicella* from the Alps"—the new species which I have no hesitation in referring to the genus *Zelleria*. This figure is a remarkably good one, except that two dark streaks are represented near the base along the fold and below the subcostal nervure, and my specimens do not show any such streaks, only a slight cloud at the base of the costa.

When I first saw this *Zelleria*, I believed it identical with the *Zelleria fasciapennella*, Logan, and it would appear that I so determined a specimen for Professor Frey. Frey's *fasciapennella* is, however, judging from his description of the markings in the apical cilia, clearly identical with the insect figured by Herrich-Schäffer in his Neue Schmetterlinge.

On comparing bred specimens of this Alpine *Zelleria*, with Scotch specimens of *Z. fasciapennella*, the differences between the two are sufficiently obvious. The Alpine *Zelleria* is a smaller, neater, whiter insect, the medial fascia starts more obliquely from the inner margin, and does not reach the subcostal nervure, so that no complete fascia (as in the Scotch insect) is formed, and the two dark lines round the apex in the cilia are sharply and distinctly marked, whereas in the Scotch *Z. fasciapennella* we see scarcely a trace of any such markings; besides this, the Alpine species has the posterior wings paler and more pointed.

At the end of May, 1865, Herr Ernst Hofmann discovered on the Kaiserberg, near Oberaudorf, a larva feeding in the heart of *Saxifraga aizoon*, of which he kindly sent me two, one of which was figured by Miss Thomson. From the larvæ he collected in 1865 only a single crip-

pled imago was reared, but in 1866 he was more fortunate and several specimens of the new *Zelleria* were reared, for which I now propose the name *Saxifragæ*. Its synonymy will be as follows:

ZELLERIA SAXIFRAGÆ, Stainton.

Zelleria fasciapennella, Frey (*non* Logan, *nec* Stainton).

Swammerdamia alpicella, Herrich-Schäffer, Neue Schmett. fig. 45.

Swammerdamia alpicella ♀, Herrich-Schäffer, Schmett. von Europa, v. p. 282, (*non* ♂, *nec* fig. 359).

It will now be interesting to ascertain if our Scotch species, the original *fasciapennella*, Logan, is also attached to one of the Saxifrages, a point which I commend to the attention of Scotch Entomologists.

VIII. *Remarks upon the Homologies of the Ovipositor.* By A. E. Eaton, B.A.

[Read 17th February, 1868.]

Reading in the Proceedings of the Society (Proc. Ent. Soc. 1867, p. lxxxv), that the Homology of the Ovipositor formed the subject of a discussion at the April meeting of 1867, and seeing that no definite conclusion was arrived at upon the matter, I have ventured to put together a few observations relating to the question, hoping that they may go a little way towards its solution.

I shall take as a criterion the ovipositor of the adult *Agrion*, because in this genus, the elements composing that organ remain free during the whole course of their development. There are three pairs of these elements in *Agrion*. One pair constitutes the terebra, the next the inner valvulæ, the third the outer valvulæ, otherwise called the valvulæ vaginales. The terebra is formed of long ensiform pieces, (*ogdo-tergo-rhabdites*, Lacaze-Duthiers) denticulated towards the apices, which arise from the middle of the posterior edge of the eighth abdominal ventral arcus. It produces a somewhat carinate ridge on the under-surface of the apparatus. From behind and above it, near the centre of the base of the ninth abdominal ventral arcus (*sternite*, Lac.-Duth.) spring the linear inner valvulæ, (*ennato-sterno-rhabdites*, Lac.-Duth.). Exterior to these, from a longitudinal base, and from the same segment, the lamelliform, truncate, and slightly appendiculated valvulæ vaginales (*ennato-episternites*, Lac.-Duth.) grow out: these with the terebra enclose the inner pair. [I drew up this description, and those afterwards given, from moistened cabinet specimens.] In *Calopteryx* and *Libellula* the inner valvulæ are sub-obsolete, if not entirely suppressed.

The egg-valve of certain *Ephemeridæ* is not specially homologous with any of the elements of the ovipositor of *Agrion*. It is just possible that it may exhibit the same general homology as the terebra; for in *Leptophlebia vespertina*, Lin., (*cincta*, Retz.), it is merely a minute projection from the middle of the apical border of the seventh ventral arcus. Its special homologue seems to be a production from the lamina subgenitalis of *Deti-*

cus. In *Baëtis,*‡ Burm., and in *Baëtis,* Leach, the egg-valve takes the form of an entire membrane, and arises from an extensive transverse base; the same organ is bifid in the subgenus *Cloëon* of the genus *Baëtis,* Leach. Its serial homologue is the "last ventral plate" of *Baëtis,*‡ Burm., and the so-called "egg-valve" of *Potamanthus* (*Leptophlebia*) of Dr. Hagen's Synopsis of the British *Ephemeridæ.*

Of the *Orthoptera* possessing the ovipositor *Deticus verrucivorus,* Lin., may be taken as an example. In this insect the instrument in question seems at first sight to be simply bivalvular; but upon a close inspection each valve is found to be made up of three elements intimately adhering to one another. On dividing the lamina subgenitalis longitudinally it will be seen that the first pair of elements proceeds from the middle of the apex of the eighth ventral arcus; this pair (*ennato-tergo-rhabdites,* Lac.-Duth.), is therefore specially homologous with the terebra. The remaining pairs, the valvulæ vaginales externæ (*ennato-episternites* and *ennato-sterno-rhabdites* anchylosed, Lac.-Duth.), and valvulæ internæ (*ennato-sternites* or *gorgerets,* Lac.-Duth.), maintain positions with respect to the first pair and to each other corresponding with those occupied by their special homologues in *Agrion.* Being more intimately adherent to the outer valvulæ than the terebral elements, and being moreover covered by them, the inner valvulæ are demonstrated with greater difficulty than the other pairs of elements. Their limits are however indicated by a shallow groove which runs almost to the acute apex of each outer valvula on the inner side; and on cutting across the valves each element seems to be provided with a special tracheal tube. As Fischer (Orthop. Europ. p. 21) ascribes a simple bivalvular ovipositor to *Rhaphidophora cavicola,* Kol., it may be surmised that a more complete union obtains between its components, than is arrived at in *Deticus.*

It is not possible at present to determine exactly the homologies of the ovipositor of *Hymenoptera* in every family, because the mode of its development has not yet been observed with sufficient care (so far as I am aware) in any group other than the *Aculeata.* In describing the *sting* I shall employ the terms used to denote the

‡ This symbol distinguishes a misapplied name. I propose to call this genus *Ecdyonurus.* Type, *E. venosus,* Fabricius.

parts of the, in some degree, homologous organ of the *Ichneumonidæ*. According to Mr. Packard,* during the semi-pupa stage of the development of *Bombus*, the first two pairs of elements arise in juxta-position from the eighth abdominal ring; whilst the third pair is given off from the apical edge of the ninth ring: and at this period they are in the form of slender non-articulated tubercles. The two outer pairs ultimately ensheath the inner pair completely. From this it appears that the spiculæ filamentosæ (*ennato-tergo-rhabdites* or *stylets*, Lac.-Duth.), which lie in the groove of the acus (*gorgeret* or *ennato-sternite*, Lac.-Duth.), homologize specially with the terebral elements of *Agrion*. Unfortunately it is not stated in the Annals of Natural History (*loc. cit.*) what becomes of the remaining pairs of elements: so that whether they become anchylosed together so as to form the acus (an event not altogether incompatible with its anatomy), or whether, on the other hand, the second pair cohere to form the acus, and the third pair maintain their distinctness under the form of the ovipositor, is a matter of uncertainty. On the earliest opportunity I will make the observations necessary for the decision of this question. Meanwhile it is clear that neither of them is specially homologous with any of the elements of the ovipositor of *Agrion*, and that the third pair of elements presents the same general homology as the terebra, whether it forms a part of the acus, or whether (as I am inclined rather to believe) it is the ovipositor.

In short it may be regarded as certain that the Aculeus of *Hymenoptera* and the Ovipositor of *Agrion* have very little in common with one another. Indeed so different are they that it might almost be regarded as an impropriety of language to say that the one is a modification of the other. The number indeed of their components is identical, but in scarcely anything besides the number of their constituents can it be said with M. Lacaze-Duthiers that "*les tarières des Névroptères sont semblables aux tarières des Hyménoptères.*"—(Ann. Sc. Nat. Fr. 1853, tom. xix. p. 30).

In his elaborate and most valuable "Recherches sur l'Armure Génitale Femelle des Insectes," (Ann. Sc. Nat. Fr. 1849-1853), the author just named upheld the hypothesis

* An abstract of Mr. A. S. Packard's paper, On the Development and Position of the *Hymenoptera*, is given in Ann. and Mag. Nat. Hist., 3rd ser., vol. xviii. p. 82, et seq.

that the elements of an abdominal segment enter into the composition of the ovipositor. And Mr. Bates inquired at the April meeting of 1867, whether the ovipositor was not a modification of an abdominal segment. (See Proc. Ent. Soc. 1867, p. lxxxv). The observations of Mr. Packard, cited above, both invalidate that hypothesis and answer this question in the negative. He says that in the semi-pupa stage of the development of *Bombus* the elements which go to form the aculeus lie in three separate pairs, and in two groups, in the form of slender non-articulated tubercles, arising on each side of the mesial line of the body. (The elements of the segments from which the components of the aculeus grow out being gradually reduced in size, ultimately become the chitinous basal supports of that organ.) Now where a segment is derived from a pre-existing segment, it is formed by a transverse division of that segment, and not by the coalescence of various outgrowths from that segment. Therefore the development of the elements of the Aculeus and the Ovipositor proceeding in a manner different from that of the elements of a segment, those cannot be in any degree homologous with these.

IX. *A Monograph of the British* Neuroptera-Planipennia.

By R. MacLachlan, F.L.S., *Sec. Ent. Soc.*

[Read 3rd February, 1868.]

As a further contribution to a knowledge of British Neuropterous insects, I have the honour to present to the Society a Monograph of the native species of *Planipennia*, or true *Neuroptera*, comprising the *Sialidæ*, *Panorpina*, *Rhaphidiodea*, and *Megaloptera* of Burmeister. I enumerate forty-nine species as belonging to our Islands, thus :—

Sialidæ	2
Raphidiidæ	4
Hemerobiidæ . . .	23
Coniopterygidæ . . .	3
Chrysopidæ	13
Panorpidæ	3
Boreidæ	1
	49

The number described for Europe is at present about 150, and in the more obscure groups, especially in the *Hemerobiidæ*, Britain is well represented; but, on the other hand, there is a total absence of many conspicuous species, genera, and even families. Thus we have no native member of the handsome *Myrmeleonidæ*, *Ascalaphidæ*, or *Nemopteridæ*; we want the curious *Dilaridæ* and *Mantispidæ*, and the singular Tipuliform genus *Bittacus*. It has been suggested that some of these do occur here, and are overlooked, but it is scarcely possible that such conspicuous objects should have hitherto escaped observation. Some species, generally abundant on the Continent, are either rare here, or very local, such as *Drepanepteryx phalænoides*, *Micromus aphidivorus*, *Megalomus hirtus*, *Hemerobius concinnus*, &c. The extraordinary *Psectra diptera*, a species universally rare, has been found in Somersetshire. Of those peculiarly British, *Sisyra terminalis* and *S. Dalii* are probably the only examples, and it is very unlikely that we can long retain undisputed claim to these.

Of the three great divisions of the Linnean *Neuroptera* that I have up to the present time investigated for the purpose of monographing, I have found the *Planipennia* the most difficult;—not on account of having been less attended to by authors, but that these have almost invariably neglected the most important characters; and had I taken the advice of a valued continental correspondent, I should have made *tabulam rasam* of all names given before the last thirty years, and commenced anew. Stephens' collection has enabled me to determine most of his species with tolerable certainty; but it is not to him alone that the chaotic condition into which the synonymy has fallen is due.

Here, as in all other *Neuroptera*, the chief characters are to be found in the structure of the abdominal segments, and the parts appended thereto; and it is always desirable that living insects should be examined when that is possible. I have endeavoured to elucidate this part of the subject as much as possible, and the numerous illustrative figures have been lithographed from my own drawings. The same remark will apply to the outlines of neuration, a character also of great importance, especially for the discrimination of genera.

Having spoken of neuration, it behoves me to enjoin caution in deductions from this character. In many *Planipennia* the veining is unstable both in species and individuals; and the Neuropterist must obtain that experience necessary to discriminate specific from accidental or individual variation.

The genus *Hemerobius*, as restricted, has been a cause of great perplexity, and I can scarcely hope to have escaped serious errors. I believe, however, that the characters given will prove of service to those who may hereafter have the fortune to be able to improve upon them.

The materials from which I have worked include most of the British collections of these insects, the possessors of which have my thanks for their courtesy, and especially am I beholden to the veteran Entomologist, J. C. Dale, Esq., for his great kindness in committing to my care unique and valuable specimens. My Continental collection is very rich in *Hemerobiidæ*; it contains many type-specimens named by Schneider, and others that I owe to the co-operation of Herr Brauer. Thus it is hoped that, though imperfect in many respects, this monograph may prove useful as a starting-point for future investigators.

A few words of advice on the method of preparing these insects for collections may not be out of place. I strongly urge that all should be pinned, and placed so high on the pin that no part of the specimen touches the surface of the receptacle in which it is contained; the plan of mounting them on card, now often adopted, is not advisable, especially as by so doing it is almost impossible to examine the abdominal parts, which become filled in with the gum used in mounting, and the neuration can always be better investigated when the wings can be held free against the light.

In conclusion, it is necessary to explain the present position of my contemplated project of monographing all the groups of British Neuropterous insects. With this work the *Trichoptera* and true *Neuroptera* are finished, excepting in so far as supplementary information may be supplied. Among the *Pseudo-Neuroptera*, the *Psocidæ* have already received attention. The *Odonata* will scarcely require more than cataloguing, as a monograph of these could not be other than an extracted copy from De Selys Longchamps' and Hagen's exhaustive works on the subject. The *Perlidæ* I hope to place on the same footing as the groups now finished. The *Ephemeridæ* will probably be worked out by a gentleman (Mr. A. E. Eaton) who has bestowed upon them far more care than I have yet been able to do, and I leave that most difficult family in his hands.

Explanation of the Abbreviations in the Bibliographical References.

Those works which are marked with an asterisk, I have not been able to consult, and the references to them are given on the authority of Dr. Hagen's "Synopsis Synonymica."

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I divide the *Planipennia* into three divisions, *Sialina*, *Hemerobiina*, and *Panorpina*.

I. SIALINA.

Wings in repose more or less vertically deflexed; the posterior pair with a slightly developed anal portion. Front not prolonged into a rostrum. Larva aquatic, or sub-cortical.

II. HEMEROBIINA.

Wings in repose very strongly vertically deflexed; mostly similar in form; no anal space in the posterior, which are thus scarcely folded. Front not prolonged into a rostrum. Larva arboreal, or aquatic.

III. PANORPINA.

Wings in repose carried horizontally in a longitudinal direction, linear, equal.* Front prolonged into a rostrum. Larva living in the earth.

Division I. SIALINA.

Antennæ filiform. *Head* transverse (*Sialidæ*) or elongate (*Raphidiidæ*); front not prolonged; *mandibles* toothed internally; *maxillary palpi* filiform, 5-jointed; labial 3-jointed. *Prothorax* moderate and thick (*Sialidæ*), or very long and slender (*Raphidiidæ*). *Abdomen* robust. *Tarsi* 5-jointed, the third (*Raphidiidæ*) or fourth (*Sialidæ*) joint cordate; *ungues* not serrated. †

Wings ovate, sub-equal, the anal area in the posterior pair slightly developed. *Sub-costa* joining the costa before the apex (*Raphidiidæ*), or becoming confluent with the radius (*Sialidæ*); *radius* parallel with the sub-costa, emitting two or more *sectors;* the longitudinal veins and their branches are mostly furcate on the margins, are connected by few transverse nervules, thus forming large areoles; pterostigma circumscribed (*Raphidiidæ*) or not (*Sialidæ*).

Larva aquatic, or sub-cortical.

The two families, *Sialidæ* and *Raphidiidæ*, contain each only one British genus, and the particular characters of each family are indicated in those above given for the division.

* In *Boreus* the wings are rudimentary.

† In the large exotic *Sialidæ* belonging to the genera *Corydalis* and *Chauliodes*, the antennæ are often pectinated in the male, and the joints of the tarsi are all filiform.

Family I. SIALIDÆ.

The characters of the family, so far as native insects are concerned, are those of the genus.

Genus I. Sialis, Latreille.

Head transverse; *antennæ* simple, short; *ocelli* absent; *labrum* sub-trigonate and deeply notched in the middle in the ♂, (Pl. VIII. fig. 1 *g*), rounded in front and with a very slight notch in the ♀ * (Pl. VIII. fig. 1*h*); *maxillary lobe* small, simple; *labium* small.

Prothorax large, quadrate.

Abdomen short and robust; in the male provided at the apex above with a fleshy lobe, whence are protruded two downwards-directed sub-transparent appendices; beneath is a valve capable of being moved downwards in a vertical direction.

Fourth joint of *tarsi* cordate (Pl. VIII. fig. 1*i*).

Wings more or less smoky, the veins very strong; anal portion of the posterior pair moderately developed; *sub-costa* and *radius* becoming confluent before the apex; *costal area* with numerous transverse nervules, which are straight or slightly curved, excepting in the ill-defined pterostigmatical region, where they are strongly oblique; *sub-costal area* with one transverse veinlet, placed near the middle; transverse discal nervules few, placed in three ill-defined rows.

Larva aquatic; very elongate, furnished at the sides with seven pairs of articulated filaments, by means of which it swims, and which also serve for the purpose of respiration; the abdomen ends in a long setose tail (see Westw. Introd. ii. 50, fig. 64, 18). When about to change, it forms a cell in the bank; the pupa is lively, and changes to an imago within the cell. Eggs deposited in large broad masses on the leaves of plants and other objects in the neighbourhood of the water; but often at a distance therefrom that must cause the young larvæ, when hatched, to make a considerable terrestrial journey.

We have two species which differ especially in the form of the ventral valve in the male.

* This diversity in the form of the *labrum* in the two sexes, does not appear to have been hitherto noticed.

1. Sialis lutaria, Linné.

Hemerobius lutarius, Linn. Faun. Suec. 384 (1761), according to Linné's collection; *Semblis lutarius*, Fab. Spec. Ins. i. 387; Ramb. Névrop. 447; *Sialis lutarius*, Steph. Ill. vi. 133; Pict. Ann. Sci. Nat. v. pl. iii. figs. 1, 4; *S. lutaria*, Burm. Handb. ii. 947; Brauer, Verh. z.-b. Verein. 1856, p. 397, Neurop. Aust. 52. *Sialis niger*, Lat. Hist. Nat. xiii. 44 (1805). *Phryganea flavilatera*, Linn. Faun. Suec. 379, ?.

Dark blackish; *head* with some yellowish impressed spaces in the middle posteriorly, and at the sides. *Tarsi* paler.

Wings pale smoky, scarcely darker at the base; the *veins* black, paler at the base of the costal margin; the *transverse nervule* in the *sub-costal area* of the anterior wings placed towards the base of the first cellule between the radius and sector (Pl. VIII. fig. 1, indicated at *a*).

Apex of the *abdomen* of the ♂ above forming a fleshy lobe, in which is a concave space with a prolongation in the middle; from this lobe proceed two curved, cylindrical, semi-transparent *appendices*, which are seldom seen unless pressure be applied to the abdomen of the living insect; *ventral valve* very large and obtuse (Pl. VIII. fig. 1 *c*).

Length of body 4-7 lines; expanse of wings 11-16 lines.

Very abundant everywhere in the neighbourhood of water, in May.

This insect bears the label "*lutarius*," in Linné's own hand-writing in his collection; but, his description is far more like his *Phryganea flavilatera*. The figure in Schäffer's Icon. Ins. Ratisb., referred to by Linné as representing his *lutarius*, is undoubtedly one of the smaller *Perlidæ*; but the *Sialis* is well figured by Schäffer, tab. xxxvii. fig. 9-10, and Linné does not quote this figure in his notice of *P. flavilatera*.

2. Sialis fuliginosa, Pictet.

Sialis fuliginosa, Pict. Ann. Sci. Nat. v. pl. iii. fig. 6 (1836); Burm. Handb. ii. 947; Brauer, Verh. z.-b. Verein. 1856, p. 397, Neurop. Aust. 52.

Similar to the last, but more intensely black, the wings dark smoky, decidedly darker at the base; the tarsi not paler.

The *transverse nervule* in the *sub-costal area* of the anterior wings placed in the middle of the first cellule between the radius and sector, or more towards the broad apical end of that cellule (Pl. VIII. fig. 2, indicated at *a*).

Apex of the *abdomen* of the ♂ above with a smaller fleshy lobe, with an oval concave space in the centre; the *appendices* proceeding from this lobe thicker at the apex; *ventral valve* very much smaller, triangular, the apex somewhat acute (Pl. VIII. fig. 2 *c*). A reference to the figures will render these differences in the apex of the ♂ abdomen more intelligible.

The slight differences in the neuration, above noted, appear to be constant; but I can see no other certain neural characters; indeed, the arrangement of the veins differs greatly in individuals, and in the opposite wings of the same specimen; hence the figures on Plate VIII. must only be regarded as representing the one character of the nervule in the sub-costal area.

This species is overlooked; it probably appears when *S. lutaria* is nearly over. I have taken it at Rannoch (Perthshire); on the banks of the Mole, near Box Hill; and in the neighbourhood of Haslemere. Mr. Dale has found it in Dorsetshire.

Family II. RAPHIDIIDÆ.

The characters of the family are those of the genus as given below.

Genus I. Raphidia, Linné.

Head elongate, contracted behind; *vertex* nearly plane; *ocelli* present;* *antennæ* slender, short; *clypeus* very narrowly transverse; *labrum* small, nearly quadrate; *maxillæ* with two short and thick end-lobes (Pl. VIII. fig. 3 *e*); *maxillary palpi* with the joints short, the terminal one obtuse; *mandibles* strongly toothed within; *labium* longer than broad; *labial palpi* with three short joints, the terminal one the smallest.

Prothorax long and slender, sub-cylindrical, dilated posteriorly; the sides closing over the *prosternum*, and leaving the latter free in a limited space at the posterior end, where are attached the anterior legs. *Meso-* and *meta-thorax* nearly equal, transverse, much broader than the prothorax.

* In *Inocellia*, a very closely allied genus, the ocelli are absent.

Abdomen slender in the male, robust in the female; in the male the terminal ventral segments are longitudinally cleft to admit of the insertion of the penis, which is generally broad and flattened; the lateral margins of these segments are generally thickened, and furnished with crotchets; the female is furnished with a very long and flexile ovipositor, composed of two transversely striated divisions, and ending in two small papillæ.

Legs moderately short, the *tarsi* with the first joint long, the third cordate and nearly concealing the fourth.

Wings nearly equal, hyaline; the neuration very similar in both pairs, open; *costal area* dilated in the middle; *costal veinlets* simple; *subcosta* joining the costa far before the apex; *radius* running parallel with the sub-costa, but carried to the apex, and there ending usually in one or more furcations; *sub-costal area* with one transverse veinlet placed before the middle; *pterostigma* more or less coloured, circumscribed by a veinlet on each side, and traversed by one or more oblique veinlets within;* *sectors*, generally two, which soon divide, and the branches are twice, thrice, or four times forked on the margins, the principal branches are connected by two rows of transverse veinlets, and thus form more or less elongate cellules beneath the pterostigma; the *cubitus anticus* starts from towards the base of the radius, and furcates almost immediately, the two branches being connected by two transverse veinlets, and thus forming three large cellules, both branches emitting forks to the dorsal margin, which are there again forked, like the branches of the sectors. The anal space of the wings is very small, and scarcely evident.

In repose the insect elevates its prothorax and deflexes its head.

Larva with an elongated subquadrate head, and with the prothorax nearly similar in form; the meso- and meta-thorax small, and much narrower; the abdomen long and dilated, gradually attenuated at each end; furnished with short 3-jointed antennæ, and strong toothed mandibles; the legs are short, with simple tarsi. *Pupa* in form more resembling the imago, and with the indications of sex strongly apparent. The larva lives beneath the bark of trees, and subsists upon larvæ and other creatures frequenting such situations. The pupa

* In *Inocellia* the pterostigma is without an internal veinlet.

is not contained in a cocoon, but lives in a cell formed by the larva; before the final metamorphosis, it emerges from this cell, and travels until it finds a favourable place, when the skin splits along the back, and the imago appears.

The species can only be separated with certainty by an examination of the anal parts of both sexes, in combination with neuration, &c. It should always be borne in mind that the neuration is liable to vary, and hasty conclusions should not be formed from single specimens presenting unusual characters in this respect. The synonymy is in a terribly confused state, and it has been the custom with many to refer every specimen to *R. ophiopsis* of Linné; but in England we do not possess that species, or, at any rate, that which is so referred (and, I think, rightly,) by Continental authors. I define four British species from an examination of about one hundred native examples, including those in the British Museum, in my own collection, and others kindly lent me by Messrs. Dale, Desvignes, Wormald, Parfitt, Waterhouse, etc., and I have also been aided by my Continental collection, which contains about forty specimens, and nine species, including types communicated to me by Herr Brauer.

1. Raphidia notata, Fabricius.

Raphidia notata, Fab. Spec. Ins. i. 402 (1781); Schum. Versuch, p. 13, fig. 3; Ramb. Névrop. 436. *R. ophiopsis*, Curt. Brit. Ent. pl. xxxvii (1824), not of Linné; Zett. Ins. Lapp. 1054 (according to Hagen). *R. megacephala* (Leach), Steph. Ill. vi. 130 (1836); Hag. Ent. Ann. 1858, p. 31. *R. media*, Burm. Handb. ii. 964 (1839); Schn. Mon. Raph. 76, pl. iv. fig. a-f; Brauer, Neurop. Aust. 53; Hag. Tr. Ent. Soc. ser. 3, v. 495.

The description is made from fresh examples.

Head very broad, the sides rounded, behind rather suddenly contracted into a short thick neck; black, very finely and closely punctured above and beneath; above there is a longitudinal, somewhat reddish, smooth median space, extending from the ocelli to the hinder margin, and divided by an impressed line; beneath the hinder edge of the neck is produced in the middle into a sort of tooth; *front* black; *clypeus* yellowish suffused with

black; *labrum* black; *palpi* black, yellow at the sutures; *ocelli* prominent, equidistant; *antennæ* blackish, yellowish at the base.

Prothorax swollen behind, black, transversely rugose and pubescent, the hinder edge narrowly yellowish; free anterior and posterior portion of the prosternum yellow. *Meso-* and *meta-thorax* black, the sutures beneath narrowly yellow.

Abdomen black; sides with yellow interrupted double lines, forming elongated spots on each segment, each spot towards the dorsal surface is expanded widely on the posterior margin of each segment; between these spots is usually a smaller indistinct one; beneath, each segment is broadly margined posteriorly with bright yellow. *Penultimate segment* in the ♂ narrow, above excised in the middle posteriorly, the sides very oblique, beneath ending in two large bulbous bases; in the open space formed by the distant ventral margins of this segment is inserted on each side a thick yellow piece, dilating greatly before the apex, which is produced into an incurved crotchet; *penis* broad, pointed at the apex, with an impressed line in the middle; above the two crotchets before-mentioned, are two much longer ones also directed inwards (and usually concealed in dry specimens, owing to the collapsing of the adjacent parts); above, the abdomen terminates in a hood-shaped hairy piece, concave beneath, strongly directed upwards, triangular when seen from the sides, and with the margins turned inwards. In the ♀ the last ventral segment is broadly rounded, the sides very oblique (Pl. VIII, figs. 3 *a-d*).

Legs yellowish; *femora* all blackish except at the extreme apex; *tarsi* somewhat fuscescent.

Wings (Pl. VIII. fig. 3) broad, obtusely rounded, with a slight smoky tinge, and yellowish at the extreme base; *pterostigma* dark brown (sometimes with a small hyaline mark at each end), large, the inner edge concave, the outer edge very oblique, with two transverse veinlets, one of which is usually forked; these veinlets vary greatly (exceptionally there is only one which very rarely is simple), the stigma commences at about the middle of the areole below it, and ends nearly at the same point with it; twelve to fifteen *costal veinlets*, whereof one is often forked; *subcosta*, as a rule, ending so close to the pterostigma as to be almost confluent with its inner

edge; four (very rarely three) *discoidal areoles*, varying much in form, the second being frequently triangular, and shorter than the others; neuration strong and black, the base of some of the longitudinal veins, the costa for about half its length, and the two first costal veinlets, generally yellow; marginal veins bifurcate or quadri-bifurcate at the apical, simply furcate on the dorsal margins.

Expanse of wings 11-14 lines.

The largest and perhaps the most common species. The above description is made from specimens beaten from fir-trees near Croydon. Some examples from other localities have a slightly different appearance, and the sub-costa does not so closely reach the pterostigma, but I can detect no other important difference.

This must certainly be the true *notata* of Fabricius, who described the species from an English specimen, and no other allied insect is found here. Moreover, a fragment of Fabricius' type still exists in Banks' collection, and is sufficient to decide the matter, although nearly destroyed. I am not clear as to the *notata* of Schneider and others, which ordinarily should have only three discoidal areoles, indistinct ocelli, etc., etc.

2. Raphidia xanthostigma, Schummel.

Raphidia xanthostigma, Schum. Versuch, p. 12, fig. 3 (1832); Burm. Handb. ii. 963; Schn. Mon. Raph. 71, pl. iii. fig. a-e; Brauer, Neurop. Aust. 53; Hag. Ent. Ann. 1858, p. 31, Tr. Ent. Soc. ser. 3, v. 495. R. *Londinensis* (Leach), Steph. Ill. vi. 130 (1836), but not of Hag. Ent. Ann. 1858, p. 31.

The following description is drawn up from a freshly-killed male example.

Head widened in front, gradually narrowed behind; brassy-black; slightly but distinctly punctured above and beneath; upper surface nearly flat, with a deep longitudinal median line which is reddish; *front* grayish-white, with a black spot below the base of each antenna; *clypeus* grayish-white, with two reddish spots in the middle; *labrum* brownish, its anterior edge pale; *palpi* black, the sutures of the joints yellowish; *ocelli* indistinct; *antennæ* fuscous, the basal third yellow.

Prothorax covered with small wart-like tubercles; black above; the anterior margin narrowly yellowish, the posterior margin broadly reddish; an indistinct reddish lanceolate mark in the middle posteriorly, and another on each side; margins of the deflexed pronotum reddish-gray; the triangular portion of the pro-sternum seen posteriorly black. *Mesonotum* black, with a triangular yellowish space in front. *Metanotum* wholly black. *Meso-* and *Meta-sterna* black, with a yellow oblique line on each side.

Abdomen pitchy-black above; the sides with a yellow line, which dilates on the anterior portion of each segment, a lateral yellow line extending from the base to the antepenultimate segment; beneath, the two basal segments are spotted with yellow, afterwards the posterior margin of each segment is broadly yellow. *Penultimate dorsal segment* much swollen, nearly quadrate, the sides rounded; *terminal segment* forming a transverse yellow plate, the anterior margin of which is excised (Pl. VIII. fig. 4 *a*). After death the sides of this segment collapse, and then the plate assumes the form represented by fig. 4 *c*. *Beneath* the deflexed lateral margins of the penultimate segment are blackish with a gray spot, provided with a long, thin, curved, pointed, reddish-testaceous crotchet, extending nearly to the apex of the terminal segment; and at the base of this crotchet is a shorter one, the curved apex of which is directed outwardly; *penis* with a greatly dilated yellow apex, with a black corneous line in the middle, which is dilated near the base (Pl. VIII. fig. 4 *b*). In the female the last *ventral segment* appears nearly quadrate, slightly transverse, the apex truncated.

Legs yellowish; the femora (especially the posterior) and terminal tarsal joint fuscous.

Wings (Pl. VIII. fig. 4) narrow; the costal margin nearly regularly rounded; *pterostigma* long, very pale yellow, with one transverse veinlet commencing and ending almost at the same points as the cellule below it; *subcosta* joining the costa slightly before the pterostigma; six to seven *costal veinlets*; three *discoidal areoles*; *first apical* vein forked, not starting from the edge of the pterostigma; terminal veins mostly once forked at the apical, and simple on the dorsal margin; neuration black, the base of the longitudinal veins yellowish.

Expanse of wings, ♂ 8 lines, ♀ 9-10 lines.

Occasionally found in woods. The male may be immediately separated from all others by the form of the terminal dorsal segment. It is the species to which Mr. Waterhouse's account of metamorphosis will apply, according to his type (See Trans. Ent. Soc. i. 23).

3. Raphidia cognata, Rambur.

Raphidia cognata, Ramb. Névrop. 438 (1842); Ed. Pict. Névrop. d'Esp. 53, pl. v. figs. 7—9; Hag. Tr. Ent. Soc. ser. 3, v. 497.

The description is made from an old ♂ example.

Head long and narrow, the sides rounded, rather suddenly constricted behind into a short neck; closely and evenly punctured both above and below; shining black, with a smooth median longitudinal reddish line extending from the hinder edge to about the middle of the occiput; *clypeus* and *labrum* reddish testaceous, fuscescent in the middle; *mandibles* reddish testaceous, blackish at the tips; *antennæ* testaceous in the basal third, afterwards blackish; *ocelli* moderately distinct, equidistant.

Prothorax slightly dilated posteriorly, rugose above, blackish, with three indistinct reddish lines behind; anterior margin narrowly, and the deflexed lateral margins broadly yellowish; free posterior portion of the pro-sternum yellowish. *Meso-* and *meta-nota* black; the former with a large yellow spot in the front of the middle.

Abdomen blackish above, somewhat lurid beneath, the margins of the segments on both surfaces, and a lateral line, bright yellow. In the ♂, the penultimate segment is broad, the sides with a deep triangular excision, the lower portion of which is short and somewhat swollen, ending in a short crotchet turned inwards; from beneath the base of this portion proceeds a longer crotchet, not extending to the apex, and strongly curved inwards at the tip; the penis is short and broad, deeply canaliculated beneath; the terminal segment is somewhat conical when viewed from above, truncated at the apex, scabrous and hairy; longly triangular when viewed from the side.

Legs yellowish; the anterior and intermediate femora with a fuscous line externally; the posterior femora wholly fuscous, except at the apex.

Wings (Pl. IX. fig. 1) nearly similar in form to those of *R. xanthostigma:* the costal margin narrower at the base,

and afterwards abruptly elevated; the sub-costa nearly joins the pterostigma; eight costal veinlets; *pterostigma* elongate, pale brownish yellow, with one transverse veinlet, commencing at about the same point as the areole beneath it, and externally extending scarcely beyond it; *first apical vein* forked, not starting immediately from the pterostigma; second twice forked; third simple; fourth, fifth, and sixth once forked; veins on the dorsal margin simple; three *discoidal areoles*; neuration fuscous, the outer edge of the costa, and the radius and other veins at the base, yellow.

Expanse of wings, ♂, 8 lines.

I have seen but one British specimen, which is in Mr. Waterhouse's Collection.

This species has much analogy with *xanthostigma*, from which it especially differs in the appendices of the ♂, in the more coarsely punctured head, &c., &c.

4. Raphidia maculicollis, Stephens.

Raphidia maculicollis (Leach), Steph. Ill. vi. 131 (1846). *R. affinis* (Leach), Steph. *l. c.* *R. hispanica*, Ramb. Névrop. 438 (1842); Schn. Stett. Zeit. 1845, p. 255; Hag. Tr. Ent. Soc, ser. 3, v. 496; Ed. Pict. Névrop. d'Esp. 52, pl. v. fig. 1—6.

The description is made from a fresh male example.

Head gradually narrowing behind, the sides rounded, the neck evident, but short; black, moderately punctured; a broad depressed median red line extends from the hinder edge to about the middle of the occiput, and there are large red irregular spots, forming an ill-defined band on each side; beneath, the whole posterior portion is red, with an impressed median black line; the rest black; *front* and *clypeus* reddish-yellow; *labrum* piceous; *ocelli* distinct, large, nearly equally distant; *antennæ* black; the basal fourth reddish-yellow.

Prothoraæ narrow in front, and gradually dilated posteriorly, rugose; black above, the anterior edge reddish, the deflexed sides of the pronotum broadly reddish; free posterior portion of the pro-sternum reddish. *Meso-notum* black, with a reddish spot in front, and a reddish tubercle behind. *Meta-notum* black.

Abdomen black; above, each segment is narrowly margined with yellow posteriorly, and at the sides; first

segment reddish-brown, with a yellowish line in the middle; beneath, the yellow margins are broader, and there is also a sub-lateral yellow line. In the ♂ the penultimate segment is truncated, the sides very oblique and excavated; beneath, on each side of the ventral fissure is inserted a long and narrow piece, greenish-yellow, ending in an intensely black anvil-shaped crotchet, the arms being produced and curved, but in opposite directions; the penis is very long, obtuse, oval, deeply canaliculated beneath, yellow, the side-margins thickened, and intensely black; at its extreme base, internally, are two short testaceous crotchets, turned outwards, and curved; terminal segment above small, the margins rounded and finely fringed, yellow. In the ♀ the last ventral segment is broad, strongly rounded, yellow.

Legs yellow; intermediate and posterior femora with an indistinct broad fuscous ring before the apex.

Wings long and narrow, the costal margin slightly rounded to the junction of the sub-costa; *pterostigma* narrow, pale yellowish brown, with one transverse veinlet, the inner edge placed near the middle of the pentagonal areole below it, the outer edge extending far beyond that areole; the *first apical vein* is simple, curved, and starts out of the base of the outer margin of the pterostigma (Pl. IX. fig. 2, indicated at *a*); *sub-costa* ending before the pterostigma; 7-8 costal veinlets; three *discoidal areoles*; second apical vein (counting the simple vein proceeding from the pterostigma as the first) tri- or quadri-furcate, third simple, fourth, fifth, and sixth once forked; neuration blackish, the costa at the base, the first one or two costal veinlets, and the radius for the greater part of its length, yellowish.

Expanse of wings, ♂, 8-9 lines; ♀, 9-11 lines.

I have seen but one living specimen of this insect, sent to me by Mr. Barrett of Haslemere. It occurs chiefly in the south of England, but Mr. Hislop has sent me an example taken in Morayshire in the north-east of Scotland, which scarcely differs from southern individuals. It may be recognized by the extent of the red markings on the head, by the position of the pterostigma with respect to the cellule below it, and especially by the first apical vein being simple, and starting directly from the pterostigma. The only other species which constantly possesses this character is *R. bœtica*, Rambur, which is to be separated by the shorter and broader head, &c.; but this must not

be confounded with *bætica* of Brauer, which=*affinis* of Schneider.

I adopt the name *maculicollis* to avoid the clashing of *affinis* with Schneider's like-named species. Stephens' description applies so far as it goes, and the examples of *maculicollis* and *affinis* labelled by Leach, who first proposed the name, belong here, but in each case Stephens had afterwards added two examples of *xanthostigma* in his Collection.

Hagen (in Ent. Ann. 1858, p. 10) incorrectly referred the two Leachian names to *ophiopsis*, as synonyms, and his description applies to the latter species.

Division II. HEMEROBIINA.

Antennæ moniliform.* *Head* transverse; front not prolonged into a rostrum; *ocelli* mostly absent (present in *Osmylus*); *maxillary palpi* 5-jointed, *labial* 3-jointed; *mandibles* with a single tooth internally. *Prothorax* moderately developed. *Abdomen* mostly slender; in the male often provided with a pair of strong appendices; in the female, for the most part, obtuse, or with a short borer. *Legs* slender; *tarsi* 5-jointed, filiform; *ungues* seldom serrated.

Wings ovate, sub-equal (the posterior pair rudimentary in one sex of *Psectra*), no perceptible anal space to the posterior, hence these are not folded. *Sub-costa* running parallel with the *costa*, and into the apex; *radius* parallel with the sub-costa, and sometimes uniting therewith near the apex, emitting one or more *sectors*, whereof the first is sometimes parallel with the radius, the rest branching off from it; *pterostigma* not distinctly circumscribed; *transverse veinlets* usually disposed, for the most part, in two or more rows like steps, and hence termed "gradate veinlets." The margins ciliated (except in *Coniopteryx*), all the veins and veinlets more or less strongly ciliated. The neuration is most strongly developed in *Osmylus*; least so in *Coniopteryx*.

Larva mostly arboreal (aquatic in *Osmylus* and *Sisyra*), elongate, and attenuated at each end,† subsisting on

* In the *Myrmeleonidæ* and *Ascalaphidæ* the antennæ are clavate or capitate: and in the *Dilaridæ* (a family of doubtful location) they are pectinate in the male.

† In the extra-Britannic families, *Myrmeleonidæ* and *Ascalaphidæ*, the larva is short and thick, and lives concealed in the earth; in the *Mantispidæ* it is parasitic in the nests of *Arachnida* and *Hymenoptera*.

Aphides, and other small insects, of which it extracts the juices. The mouth furnished with a pair of very long mandibles with which the prey is seized, at the base of which, internally, the maxillæ lie in a groove.

Pupa contained in an oval or circular silken cocoon, which is very small for the size of the imago; but shortly before the change, it cuts its way out by means of a pair of short strong mandibles, and then extends itself, having previously been coiled round, with the segments retracted.

Eggs ovate, more or less pedicillate, and attached.

Most of these insects fall down on their side, and feign death, when disturbed; the legs being then doubled up, the head drawn under the thorax, and the antennæ concealed.

The British *Hemerobiinæ* may be divided into three families, thus:—

I. Hemerobiidæ.

Antennæ moniliform. Wings mostly with numerous transverse veinlets; margins ciliated.

II. Coniopterygidæ.

Antennæ moniliform. Wings with scarcely any transverse veinlets; margins not visibly ciliated. Insects of minute size, covered wholly with a whitish powder.

III. Chrysopidæ.

Antennæ setiform. Wings with a moderate number of transverse veinlets; margins ciliated. Colour usually greenish.

The larvæ of most of these delicate insects play a great part in the economy of nature, and must be considered as benefactors of the human race in no small degree. With those of *Coccinella* and *Syrphus* they help to counteract the extraordinary fecundity of the *Aphides*; and though their numbers are seldom so great as are those of *Coccinella*, yet from their activity, and from the short time they take to extract the juices of their prey, they must destroy innumerable multitudes of these pests of the horticulturist.

Family I. HEMEROBIIDÆ.

Antennæ short; composed of a number of little rounded joints. Terminal joint of the *palpi* cylindrical, generally subulate. *Ocelli* usually absent (present in *Osmylus*). *Wings* sub-equal (except in one sex of *Psectra*); *costal veinlets* mostly furcate; *sub-costa* and *radius* separated to the apex, or (*Osmylus* and *Sisyra*) becoming there confluent; *sub-costal area* with one, or several, transverse veinlets; *radius* starting from the sub-costa, close to the base, and running parallel with it; emitting either one (whence then arise the others) or all the *sectors; gradate veinlets* generally in two series, the portion of the wing between the inner of these and the base occupied with few transverse veins, or (*Osmylus*) many; the margins, and veins, and veinlets, ciliated.

Body short; the extremity of the abdomen in the male generally provided with appendices.

Legs short, slender; the ungues generally simple.

Larva mostly arboreal (aquatic in *Osmylus* and *Sisyra*).

The following are the British genera :—

A. Ocelli present. Transverse nervules numerous. Osmylus.*

B. Ocelli absent. Transverse nervules few.

a. Radius becoming confluent with the sub-costa. (Pl. IX. fig. 3.) . . . . Sisyra.

b. Radius and sub-costa separate to the apex.

a. First sector emitting the rest. Posterior wings minute in one sex. (Pl. IX. fig. 5). Psectra.

b. All the sectors emitted from the radius. Wings ample in both sexes.

a. A recurrent veinlet at the base of the costal area in the anterior wings, forming a small free cellule. (Pl. IX. fig. 6; Pl. X. figs. 1, 5, 10, 11, indicated at *a*.)

* Apical margin excised. . Drepanepteryx.

** Apical margin entire, rounded.

† Normally not more than four sectors. Hemerobius.

†† More than four sectors. . Megalomus.

b. No recurrent veinlet at the base of the costal area. (Pl. IX. fig. 4.) Micromus.

* In a general monograph of Planipennia, *Osmylus* would form the type of a distinct family—*Osmylidæ*.

Genus I. Osmylus, Latreille.

Head with the vertex inflated; *ocelli* three, placed closely together; *antennæ* about one third the length of the wings, the joints ovate; last joint of the maxillary *palpi* acuminate, pointed.

Prothorax much narrower than the head, longer than broad.

Abdomen moderately robust; in the male, provided with two large ventral valves at the apex.

Legs slender, cylindrical; *ungues* simple; *pulvilli* large.

Wings large; *costal veinlets* both simple and forked; *costal area* narrow at the base; *sub-costa* and *radius* becoming confluent at the apex; *sub-costal area* with one transverse veinlet placed at the base; first *sector* starting from near the base of the radius, and emitting several others which mostly become furcate at the margins; the two *cubiti* parallel, running close together; the *gradate veinlets* run in two sub-parallel series, the space between the inner one and the base densely reticulated with numerous transverse veinlets, forming almost quadrate cellules. In the posterior wings the net-work is more open.

Larva aquatic.

1. Osmylus fulvicephalus, Scopoli.

Hemerobius fulvicephalus, Scop. Ent. Carn. 270 (1763). *H. maculatus*, Fab. Mant. Ins. i. 247 (1787). *Osmylus maculatus*, Lat., and other authors. *Hemerobius chrysops*, Linn. Coll. (but not *H. chrysops*, Linn. Faun. Suec. 382, according to the description). *Osmylus chrysops*, of authors. *Hemerobius laurifoliæformis*, Raz. Hist. Jor. 289 (1789).

Head shining, reddish orange; *eyes*, *ocelli*, and *antennæ*, black, the last with few and short grayish hairs.

Pro- *meso-* and *meta-thorax* blackish fuscous, with yellowish markings in the middle.

Abdomen blackish fuscous, sparingly clothed with grayish hairs.

Legs pale testaceous, terminal joint of tarsi somewhat fuscous.

Wings hyaline, with blackish fuscous spots, which, in the fore-wings, are large and somewhat quadrate, on the dorsal margin towards the base, and on the costal margin near the apex; *pterostigma* marked with pale yellowish between the dark spots; *veins* mostly blackish, a few

yellowish; the radius and sub-costa alternately blackish and yellowish. The *posterior wings* marked with blackish at the pterostigma.

Length of body 7 lines; expanse of wings 20-23 lines.

This large and beautiful insect is not uncommon in summer about streams. It varys little in size, but to some extent in the number and intensity of the spots.

A detailed history of the development, and habits of the larva, is given by Hagen, in the "Linnæa Entomologica," vol. vii. pp. 368—418, pl. iii, iv. The larval existence would appear to last about seven months. The larva does not swim, but rests on or crawls about plant stems, gravel, &c. It can scarcely be said to be truly aquatic, but is rather amphibious; that is to say, it is able to live both in the water, and among the damp moss, débris, &c., in the vicinity of it. The pupa is contained in an irregular rounded cocoon. The first certain accounts of the habits of this larva, were given by Herr Brauer, to whom Entomology is so greatly indebted for his discoveries in Neuropterous larvæ.

It will be remarked that I have rejected the Linnean name *chrysops*, and I here give my reasons for so doing. It is true that in the Linnean Collection this insect is labelled "*chrysops*" in Linné's own handwriting, but a glance at his description of the insect he intended to bear that name, proves that it could not be *Osmylus*. His words run thus:—"Viridi nigroque varius, alis hyalinis, maculatis reticulatis," and "Musca fœtida, auro oculata." A *Chrysopa* is intended by these, and this is also proved by his reference to Frisch (Insekten Teutschlands, vierdter Theil, p. 40, tab. xxiii) who describes the insect under the name of "Der gold-äugigen Stinck-Fliege."

Genus II. Sisyra, Burmeister.

Ocelli absent; *antennæ* about half the length of the wings, the joints rounded, strongly setose; last joint of the *maxillary palpi* acuminate, pointed, about four times the length of the penultimate.

Prothorax narrowly transverse, not so broad as the head.

Abdomen short, moderately robust; in the male provided with two simple corneous appendices at the apex;

in the female there is a short ovipositor, which (after death) is directed upwards and applied against the truncated terminal segment.

Legs short, slender; the tibiæ cylindrical; *ungues* simple, curved; *pulvilli* small.

Wings (Pl. IX. fig. 3) ovate, obtuse; *costal area* narrow; *costal veinlets* simple, those in the *pterostigmatical region* more numerous and strongly oblique; *sub-costa* and *radius* becoming confluent at the apex; *sub-costal area* rather broad, without a transverse nervule; only one *sector*, which starts from the base of the radius, and runs nearly parallel therewith, emitting about three branches to the apex, which are there twice forked; transverse veinlets of the disk very few in number. In the *posterior wings* the sector is more distant from the radius.

Larva aquatic, living in the interior of the fresh-water sponge, and, doubtless, in other analogous positions.

Our three species are thus tabulated:—

A. Wings unicolorous, with no trace of spots.
   a. Antennæ wholly dark. . . . *S. fuscata.*
   b. Antennæ with pale tips. . *S. terminalis.*
B. Anterior wings with an appearance of darker spots. . . . . *S. Dalii.*

1. Sisyra fuscata, Fabricius.

Hemerobius fuscatus, Fab. Ent. Syst. ii. 84 (1793); Steph. Ill. vi. 114, pl. xxx. fig. 10; *Sisyra fuscata*, Burm. Handb. ii. 976; Ramb. Névrop. 416; Wesm. Bull. Acad. Brux. 1840, p. 213; Hag. Stett. Zeit. 1858, p. 131; 1859, p. 412; Ent. Ann. 1858, p. 25; Brauer, Neurop. Aust. 55. *Hemerobius confinis*, Steph. Ill. vi. 144 (1836). *H. nitidulus*, Steph. *l. c.* (not of Fab.). *Sisyra nigripennis*, Wesm. Bull. Acad. Brux. 1840, p. 412. *Hemerobius fumatus*, Mots. Etud. i. 20 (1853).

Larva:—*Branchiotoma spongillæ*, Westw. Tr. Ent. Soc. iii. 105, *id.* Introd. ii. 586; Hogg, Tr. Linn. Soc. xviii. 363; Hal. Proc. Ent. Soc. 1848, p. xxxi.

Blackish fuscous, somewhat shining, sparingly clothed with yellowish hairs; *antennæ* wholly black.

Legs pale testaceous; *tarsi* darker, pale at the tips of the joints.

Wings uniformly shining fuscous; neuration blackish, ciliated with golden; two or three transverse veinlets about the middle of the anterior wings, placed irregularly, and three or four at the base; pterostigmatical region scarcely darker.

Abdomen of the male, above, provided at the apex with two incurved and sharply-pointed appendices; ventral plate large, rounded, obtuse.

Length of body 2-2½ lines; expanse of wings 6-6½ lines.

Common throughout the summer, especially about streams, but also occasionally frequenting standing waters; generally distributed.

The larva, described as *Branchiotoma spongillæ* by Westwood, was discovered by Mr. Hogg, in the substance of *Spongilla fluviatilis*. It is remarkable from the form of the respiratory filaments, which are placed on the under surface of the abdomen, and, in being articulated, somewhat resemble legs.

Certain examples of this species are darker than the ordinary specimens, and form Wesmael's *nigripennis*; perhaps Burmeister's *morio* should also be referred here.

Rambur would appear to have mistaken the sexes; his words "Extrémité abdominale du male ayant un appendice courbé en haut en forme de crochet," must refer to the ovipositor of the female.

2. Sisyra Dalii, MacLachlan.

Sisyra Dalii, M'Lach. Ent. Mo. Mag. ii. 268 (1866). *Hemerobius nitidulus* (Dale), Walk. Brit. Mus. Cat. 296 (not of Fab.).

Castaneous or pale testaceous, clothed with golden hairs; *antennæ* dark fuscous, with a pale basal joint.

Legs pale yellowish, the terminal joint of the tarsi tipped with blackish; clothed with pale hairs.

Wings pale testaceous, sub-hyaline, shining; neuration testaceous; in the *anterior wings* the transverse veinlets, the axilla of one or two furcations, and a spot on the dorsal margin towards the base, fuscous; hence these wings have a slightly dotted appearance; four transverse veinlets in the middle of the wing, two of which are placed in a line, and four others towards the base: *posterior wings* paler, the radius and two transverse veinlets blackish.

Abdomen fuscescent; in the male there are two short and obtuse blackish appendices; the ventral plate short and broad, pale.

Length of body 2 lines, expanse of wings 5½-6 lines.

Taken by Mr. Dale at Ambleside, and also in Dorsetshire. I once found it sparingly, in June, on the banks of the Mole, near Reigate, Surrey.

3. Sisyra terminalis, Curtis.

Sisyra terminalis, Curt. Tr. Ent. Soc. N. S. iii. 56 (1854); Hag. Ent. Ann. 1858, p. 25.

Testaceous or fuscescent, with golden pubescence; *antennæ* black, the apical fourth pale yellowish.

Legs pale grayish yellow, with yellow pubescence.

Wings pale cinereous, shining; the *posterior wings* paler and iridescent; neuration pale grayish-fuscous, with pale ciliation; in the *anterior wings* only one transverse veinlet in the middle, one near the apex, and four or five at the base (Pl. IX. fig. 3).

Abdomen fuscescent; in the male the appendices are small and scarcely evident; the ventral plate is short, broad, and obtuse.

Length of body 2 lines, expanse of wings 5½-6½ lines.

Appears in summer. Originally discovered at Killarney, Ireland, by Mr. Haliday; occurs along the Thames, near Richmond, and I once found it abundantly on the banks of the Mole, near Reigate.

Genus III. Psectra, Hagen.

(Stett. Zeit. 1866, p. 376).

Head with the *vertex* strongly inflated and rounded; *ocelli* absent; *antennæ* rather longer than the wings, the joints rounded; *maxillary palpi* long and slender, the two basal joints short, the third and fourth longer, the fifth still longer, cylindrical, and slightly acuminate.

Prothorax transverse, quadrilobate above. *Meso-* and *meta-thorax* with their lateral lobes strongly developed.

Abdomen short and robust.

Legs moderately long; *tibiæ* gradually dilated in the middle, sub-compressed; *tarsal joints* short; *ungues* small, broad.

Wings very unequal in the male; the posterior pair rudimentary, in the form of small, scarcely evident, lobes, with one strong vein in the middle. *Anterior wings* somewhat narrow and elongate, obtusely rounded at the apex, convex above; *costal veinlets* for the most part simple, a few forked; *costal area* rounded; *subcosta* and *radius* separated to the apex, distant; *sub-costal area* broad, one transverse veinlet near the base, two in the middle, and two near the apex; one forked *sector*, the upper branch of which runs parallel with the radius; veins all simply furcate on the margins; *gradate veinlets* in oblique series, the outer of which is complete, the inner rudimentary; all the veins and veinlets very strong, and, with the margins, strongly ciliated; a rudimentary vein in the form of a tubercle in each marginal interstice.

The female is said to have developed posterior wings. Burmeister speaks of three sectors, but I think his two first are more properly referred to the two cubiti. I am indebted to my friend Mr. Rye for the figure at Pl. IX. fig. 5; the abdomen is probably represented as too elongate and pointed, but the unique example from which the figure was drawn is not in a sufficiently good condition to ensure absolute correctness in this respect.

1. Psectra diptera, Burmeister.

Hemerobius dipterus, Burm. Handb. ii. 973 (1839); Curt. Tr. Ent. Soc. N. S. iii. 56; M'Lach. Ent. Mo. Mag. ii. 269.

Shining blackish-fuscous, with golden pubescence.

Antennæ with about forty-five joints, the basal one long and much dilated.

Thoracic lobes paler than the rest of the body, dark castaceous.

Legs pale yellowish, the tip of the femora, base of the tibiæ, and terminal joint of the tarsi, fuscous.

Wings sub-hyaline, shining, slightly testaceous; with fuscous spots, and the gradate veinlets broadly margined with fuscous; veins for the most part pale, with distant black tubercles, from each of which springs a blackish hair; all the marginal forks and gradate veinlets deep fuscous; six veinlets in the outer gradate series, and two in the inner, but between the latter and the base are

four others placed in two pairs, one within the other; the margins longly ciliated with fuscous. The rudimentary *posterior wings* are hyaline, with a strong testaceous vein in the middle (Pl. IX. fig. 5).

Length of body 1⅓ line; expanse of wings 3½ lines.

One example of this extraordinary creature was taken off a hazel-bush at Breach Wood, near Langport, Somersetshire, on the 26th June, 1843, by J. C. Dale, Esq., through whose kindness in entrusting it to my care, I am enabled to draw up the above description.

This insect, though very widely distributed in Europe, is excessively rare, and I believe that not more than four or five examples are known. The female, with developed posterior wings, is said to be in the Berlin Museum.

Genus IV. Micromus, Rambur.

Ocelli absent; *antennæ* shorter than the wings, the joints oval or conical, strongly setose; last joint of the *maxillary palpi* scarcely longer than the penultimate, acuminate, the end considerably elongated.

Prothorax narrow, transverse.

Abdomen short, slender in the male, more robust in the female; the apex in the male provided with a concave ventral plate, in which lie two corneous, curved, needle-shaped appendices (Pl. IX. fig. 4 *a-b*).

Legs slender; *tibiæ* sub-cylindrical; *ungues* simple; *pulvilli* scarcely evident.

Wings ovate, obtuse. *Anterior wings* with the *costal area* narrow at the base, with no recurrent veinlet, afterwards somewhat dilated; *costal nervules* mostly forked; *sub-costa* and *radius* separated to the apex; *sub-costal area* narrow, with one transverse veinlet at the base, and sometimes one near the apex; three or four *sectors* all starting from the radius, and all twice or thrice forked on the margin; *gradate veinlets* mostly in two very oblique series, which are somewhat distant, the inner one traversing the middle of the wing. *Posterior wings* narrower than the anterior; the costal area very narrow, with simple veinlets.

Larva probably similar to that of *Hemerobius*.

These insects, which otherwise much resemble *Hemerobius*, may be recognized by the narrow base of the costal area of the fore-wings, and by the absence of a recurrent nervule therein (Pl. IX. fig. 4).

We have three species, so different that a tabular arrangement is unnecessary.

1. Micromus variegatus, Fabricius.

Hemerobius variegatus, Fab. Ent. Syst. ii. 85 (1793); Steph. Ill. vi. 113; Zett. Ins. Lapp. 1049; Burm. Handb. ii. 974; Wesm. Bull. Acad. Brux. 1840, p. 214; *Micromus variegatus*, Ramb. Névrop. 417; Costa, Faun. Nap. 4, pl. x. fig. 2; Brauer, Neurop. Aust. 58; Hag. Ent. Ann. 1858, p. 26.

Fuscous, with whitish pubescence; *head* testaceous posteriorly; *palpi* whitish; *antennæ* whitish, with fuscous annulations, the basal joint wholly fuscous; posterior lobe of the *meso-notum*, and scutellum of the *meta-notum*, whitish.

Legs whitish; the *tibiæ* with a faint fuscous ring towards the middle, and fuscous at the apex; *tarsi* blackish at the extreme tips.

Wings narrow, whitish, sub-hyaline; *anterior wings* with two irregular black fasciæ following the gradate veinlets, the inner one continued as a blotch towards the base, the outer one formed of two irregular blotches; margins and veins spotted, and interrupted with black; *neuration* forming large cellules; about five veinlets in each of the *gradate series*, and one or two others towards the base; neuration and margins longly ciliated with whitish. In the *posterior wings* the apex is spotted with black, in the form of three irregular blotches; neuration mostly white (Pl. IX. fig. 4).

Anal appendices of the male, needle-shaped, the ventral lobe large; the abdomen above, with two oval valves at the apex.

Length of body 2-2½ lines; expanse of wings 6 lines.

Frequent in summer, and generally distributed.

2. Micromus aphidivorus, Schrank.

Hemerobius aphidivorus, Schrk. Ins. Aust. 313 (1781). *H. angulatus*, Steph. Ill. vi. 106 (1836). *H. villosus*, Zett. Ins. Lapp. 1050 (1840); *Micromus villosus*, Brauer, Neurop. Aust. 58. *M. intricatus*, Wesm. Bull. Acad. Brux. 1840, p. 214; Hag. Ent. Ann. 1858, p. 26. *M. tendinosus*, Ramb. Névrop. 417 (1842). *H. lineatus*, Gözsy, Sitz. Akad. Wiss. 1852, p. 346.

Brownish-ochreous, with yellow pubescence; *front* paler; *palpi* testaceous; *antennæ* testaceous.

Legs testaceous, with concolorous pubescence.

Wings short and broad, very obtuse. *Anterior wings* testaceous; with two narrow transverse brown fasciæ following the gradate veinlets, intersected by three similar longitudinal fasciæ, running into the apical margin; the membrane with numerous short transverse brown streaks; *neuration* dark fuscous, with paler interruptions; four or five *sectors;* about eight veinlets in the outer *gradate series,* six in the inner, and about three towards the base; margins and neuration slightly ciliated with golden-testaceous. *Posterior wings* paler, more hyaline; *pterostigmatical region* and neuration brown.

Abdomen of the male with pale anal valves, the ventral one very large and concave, the superior lateral ones large and rounded, with a callosity towards the base externally.

Length of body 2½-3 lines; expanse of wings 6-7 lines.

Very rare; appears in summer, and has only been met with singly, so far as I am aware, though widely distributed.

3. Micromus paganus, Linné.

Hemerobius paganus, Linn. Syst. Nat. i. 912 (1767); Vill. Linn. Ent. iii. 49; *Micromus paganus,* Brauer, Neurop. Aust. 58; Hag. Ent. Ann. 1858, p. 26. *H. nemoralis,* Steph. Ill. vi. 110 (1836). *M. lineosus,* Ramb. Névrop. 416 (1842). *H. elegans,* Gözsy, Sitz. Akad. Wiss. 1852, p. 346.

Grayish-white varied with fuscous; front shining, dark fuscous; *palpi* pale testaceous: antennæ whitish-yellow, the basal joint fuscescent.

Legs whitish.

Wings broad, very obtuse. *Anterior wings* yellowish, sub-hyaline, with two oblique, transverse, brownish fasciæ following the gradate veinlets, intersected by three longitudinal ones running into the apical and dorsal margins, the latter margin brown at the base; *neuration* whitish, sparingly interrupted with brown; five *sectors;* nine veinlets in the outer *gradate series,* six in the inner, and one or two towards the base; neuration and margins with short pale ciliation. *Posterior wings* sub-hyaline, iridescent; the outer series of gradate veinlets brown; neuration otherwise pale.

Abdomen pale at the apex, strongly ciliated; the ventral lobe of the male large, very concave, the appendices lying therein are long, extending much beyond the lobe, and curved strongly downwards. (Pl. IX. fig. 4 *a*, 4 *b*).

Length of body 3-4 lines, expanse of wings 8-9 lines.

A common species throughout the summer. (*Hemerobius decussatus* of Leach and Samouelle should be referred here.)

Genus V. Hemerobius, Linné.

Ocelli absent; *antennæ* shorter than the wings, the joints mostly rounded, strongly setose; last joint of the *maxillary palpi* not greatly longer than the penultimate, rather suddenly drawn into a long slender point at the apex.

Prothoraæ short, transverse.

Abdomen short; the male usually provided with a pair of appendices, which are frequently furcate; the apex usually obtuse in the female, but sometimes with a visible borer.

Legs slender; *tibiæ* usually somewhat dilated and compressed, attenuated at each end, occasionally cylindrical; *ungues* simple; *pulvilli* usually moderately large.

Wings ovate, strongly obtuse, the posterior pair narrower; the margins and veins strongly ciliated. *Anterior wings* with the *costal area* broad, strongly dilated at the base, the veinlets furcate, the first veinlet from the base does not reach the margin, but is directed back to the extreme base, forming a free cellule (Pl. IX. fig. 6; Pl. X. figs. 1, 5, 10, indicated at *a*), and emitting several short branches to the margin; *sub-costa* and *radius* separated to the apex; *sub-costal area* narrow, with one transverse veinlet near the base, and usually another near the apex; one to four (exceptionally five) *sectors* all starting from the radius, and running parallel into the margins, where they are twice or thrice forked: usually in each marginal space, between the veins, there is a small rudimentary, and scarcely evident, veinlet; *gradate veinlets* in two somewhat parallel series, whereof the inner is nearer to the apex than to the base; *pterostigmatical region* indistinct, filled in with very numerous oblique veinlets; in the *posterior wings* the gradate veinlets are less numerous.

Larva covers itself with the skins of the *Aphides* of which it has extracted the juices.

(Note: *Hemerobius,* as now restricted, = *Mucropalpus* of Rambur.)

In working out the species of this genus, I have experienced in full force the hopelessness of arriving at a satisfactory result with respect to the synonymy. Hitherto all authors have neglected descriptions of the appendices, which, in most cases, will, at any rate, separate the males; yet even with the help of this all-important character, it is by no means always an easy task to ensure absolute certainty, and these parts must be considered in connection with general form and marking. The greater part of the descriptions of old authors must for ever remain of doubtful application; and, in many instances, the species referred to Linnean names are different in the works of different writers. Hagen's "Hemerobidarum Synopsis synonymica" has been of great service, but I have found it impossible to view several of the older descriptions in the same light as he. I can only hope that the attempt, made in the following descriptions, to place particular stress upon structural characters may afford a more certain basis upon which to work in future. Characters drawn from the neuration of the wings are here tolerably sure, so far as sectional arrangement deduced from the number of sectors is concerned, but further than that they are of little use, especially the furcations of the sectors after they leave the radius.

The Leachian and Stephensian species are far from easy to determine; more especially as Stephens has mixed them up in some instances, and divided them in others. My earlier opinion as to the actual position of some of them has undergone considerable modification on closer examination, and yet it is probable, I may say sure, that my present ideas are not always correct. Hence, in more than one instance, I have not accorded to the names given by the two Entomologists above-mentioned, that precedence to which, by right of priority, they are entitled, and which I have otherwise endeavoured to maintain. It may be, that some future worker of the genus will be more fortunate than I have hitherto been in unravelling this tangled skein. These remarks apply especially to *H. humuli, limbatus,* and *pini.*

I have found it impossible to tabulate this genus.

Section I. *Two sectors in the anterior wings* (Pl. IX. fig. 6).

1. Hemerobius elegans, Stephens.

Hemerobius elegans, Steph. Ill. vi. 113 (1836). *H. Marshami*, Steph. Ill. vi. 114 (1836). *H. paucinervis*, Zett. Ins. Lapp. 1050 (1840). *Mucropalpus pygmæus*, Ramb. Névrop. 442 (1842); *H. pygmæus*, Brauer, Neurop. Aust. 56; Hag. Ent. Ann. 1858, p. 56; Ed. Pict. Névrop. d'Esp. 56.

Dark shining piceous, with a few pale golden hairs; *antennæ* black, with a testaceous basal joint; *front* sometimes yellowish testaceous; the whole underside of the head and thorax yellowish.

Abdomen dull pitchy-brown, with golden hairs. In the ♂ I can see no superior or lateral appendices, but the last ventral segment is produced in the middle into a short curled-up hairy lobe.

Legs very pale whitish-yellow; *femora* marked with pale fuscous externally.

Wings short and broad, pale grayish: *anterior pair* closely spotted with darker gray, and varying according to the extent to which the spots coalesce; apical and dorsal margins pale and dark gray in alternate spaces; only two *sectors; longitudinal veins* with short pale golden hairs, pale fuscous, those of the disk with whitish dotted interruptions; *gradate veinlets* dark fuscous, four in the outer series placed in two pairs, five in the inner, one of which is placed between the sector and radius, and the four others together in a line, missing two interstices from the first, and a series of three or four others near the base: *posterior wings* pale grayish, with fuscous veins and smoky pterostigma.

Length of body 2-2½ lines, expanse of wings 4-6 lines.

The smallest species; not generally common, and appears to prefer the neighbourhood of streams and rivers; in summer and autumn.

This is the only British species with two sectors, and perhaps also the only European, for the Sardinian *parvulus* may be only a form of *elegans*.

Section 2. *Three sectors in the anterior wings.* (Pl. X. figs. 1, 5).

2. Hemerobius pellucidus, Walker.

Hemerobius pellucidus, (Dale), Walk. Brit. Mus. Cat. 284 (1853); M'Lach. Ent. Mo. Mag. ii. 269. *H. fuscescens,* Walleng. Ofv. 1864, p. 22.

Shining, blackish fuscous, with very few pale hairs; *thorax* and *abdomen* paler, the latter somewhat ochreous beneath.

Legs pale dull yellowish.

Wings rather elongate, obtuse, very pale grayish, iridescent; *anterior wings* with the gradate veinlets clouded with darker gray; *pterostigma* brownish; neuration (in all the wings) wholly pale fuscous; three *sectors*; four *gradate veinlets* in the outer series; five in the inner, with two interstices between the first and second, the three others in a line, and placed between the two upper ones and the outer series; three towards the base (Pl. X. fig. 1): *posterior wings* with one or two discal transverse veinlets.

Length of body 2-3 lines; expanse of wings 4-6¼ lines.

I have not seen this insect alive, nor can I find a male with the appendices in a condition for describing.

Taken by Mr. Dale, sparingly, at Glanvilles Wootton, Dorset.

In size and general appearance it resembles pale examples of *H. elegans,* but differs in having three sectors, and in the unspotted veins.

Wallengren's description appears to apply to the species, but I have not seen his type.

3. Hemerobius inconspicuus, n. s.

Head wholly black; *antennæ* blackish-fuscous.

Thorax shining pitchy brown, paler in the middle.

Abdomen dull brownish. In the ♂ the last segment above ends in two short blackish points; the last ventral segment is produced into a long lobe, gradually narrowed, the apex obtuse, and strongly curved upwards and inwards, concave at the base internally (Pl. X. fig. 2). In the ♀ the apex of the abdomen is obtuse.

Legs pale.

Wings long, rounded at the apex, uniformly pale smoky fuscous; *pterostigma* with a brownish tinge; *neuration* fuscous, without dots, strongly hairy; in the anterior wings are three *sectors;* four veinlets in the outer gradate series, five in the inner, three towards the base.

Length of body 2-3 lines; expanse of wings 5-6¼ lines.

Found by Mr. Dale, in summer, in old furze-bushes, at Bournemouth, Hants.

This has considerable resemblance to small examples of *H. nitidulus,* but differs in its narrower wings, and undotted veins, and especially in the extraordinary form of the male appendices. It also greatly resembles *Sisyra fuscata* in outward appearance.

In my Continental Collection I have a ♀ from Silesia taken by Zeller, and ♂ and ♀ from France.

The ventral lobe in the ♂ has the appearance of an ovipositor, and had I seen that sex only, I should probably have mistaken it for the ♀, but the matter is set at rest by the examples in Mr. Dale's Collection. An approach towards this formation is seen in *H. elegans.*

The large Continental and American species which I consider to be *H. longifrons* of Walker (See Journ. Linn. Soc. ix. 273; 1867) has an analogous lobe, and I referred all the examples to the female sex, but an examination of the male of *H. inconspicuus* has created some doubt in my mind as to the correctness of my determination, especially as Herr Brauer sent me an insect of similar appearance, which is decidedly female, but has no evident borer.

4. Hemerobius nitidulus, Fabricius.

Hemerobius nitidulus, Fab. Gen. Ins. 244 (1777); Hag. Stett. Zeit. 1858, p. 131. *H. ochraceus,* Wesm. Bull. Acad. Brux. 1840, p. 217; Brauer, Neurop. Aust. 57; Hag. Stett. Zeit. 1859, p. 42. *Mucropalpus obscurus,* Ramb. Névrop. 423 (1842).

Reddish-ochreous; *face* shining piceous; *labrum* reddish; *antennæ* brown, with narrow pale rings.

Abdomen brown, with golden-yellow hairs. In the ♂ the *appendices* are deeply furcate at the apex, the prongs widely diverging, yellow; a callosity externally near the base (Pl. X. fig. 3).

Legs yellowish, the tarsi somewhat brownish.

Wings broad, and broadly elliptical at the apex; shining, unicolorous, pale fuscous, with a reddish tinge; the posterior slightly paler; in the *anterior pair* the neuration is pale, with the costal veinlets, and all the longitudinal veins, closely and regularly dotted with small dark fuscous points; *pterostigma* slightly reddish; three *sectors*; 6-7 veinlets in both *gradate series*; two or three towards the base: in the *posterior pair* the costal veinlets alone are dotted, the rest of the neuration unicolorous.

Length of body $2\frac{1}{4}$-3 lines; expanse of wings $6\frac{1}{2}$-$7\frac{1}{2}$ lines.

Not uncommon among *Pinus sylvestris*, in spring and early summer, in all woods in the neighbourhood of London.

5. Hemerobius micans, Olivier.

Hemerobius micans, Oliv. Enc. Méth. viii. 63 (1811); Wesm. Bull. Acad. Brux. 1840, p. 216; Brauer, Neurop. Aust. 56; Hag. Ent. Ann. 1858, p. 27, Stett. Zeit. 1859, p. 412. *H. punctatus*, Steph. Ill. vi. 111 (1836). *H. pallidus*, Steph. Ill. vi. 112 (1836). *H. lutescens*, Burm. Handb. ii. 974 (1839), Fab. ?. *Mucropalpus fuscinervis*, Schn. Stett. Zeit. 1845, p. 344, var. *Mucropalpus irroratus*, Costa, Faun. Nap. 11, pl. x. fig. 7 (1855).

Yellow; *antennæ* yellow; *face* concolorous, the genæ slightly castaneous; *palpi* yellow, the terminal joint slightly fuscescent; *prothorax* reddish brown on each side, clothed with rather long pale hairs; *meso-* and *metathorax* with slight fuscescent markings.

Abdomen yellow, slightly pubescent. In the ♂, the *appendices* are long, yellow, pubescent, forked at the tips, the prongs short; a callosity at the base externally (Pl. X. fig. 4).

Legs very pale yellowish.

Wings ovate, elliptical at the apex, pale yellowish, hyaline, very iridescent; *pterostigma* more decidedly yellow; *anterior pair* with the longitudinal veins and costal veinlets pale yellow, with numerous short regular fuscous streaks, longly ciliated; three *sectors*; *gradate veinlets* fuscous, eight in the outer series, six in the inner, two or three towards the base: in the *posterior pair* the neuration is wholly pale.

Length of body 2-3 lines; expanse of wings 6½-8 lines.

Common throughout the summer.

Var. a. = *Mucropalpus fuscinervis*, of Schneider.

Differs from the ordinary form, in the body being not yellowish; the wings with the membrane nearly colourless, though still highly iridescent; the pterostigma darker, brown; the longitudinal veins less clear, the costal veinlets and sub-costa wholly fuscous; the gradate veinlets in all the wings nearly black, seven in the outer series in the fore-wings.

Expanse of wings 6¾ lines; very uniform in size.

Less frequent than the type-form.

Through the kindness of Herr Brauer, I have seen a type of *fuscinervis*, labelled by Schneider himself. This variety seems to be very constant in its characters, but, save in the colouration of the veins, I can find nothing whereby to separate it specifically; structurally it seems identical.

6. Hemerobius humuli, Linné.

Hemerobius humuli, Linn. Faun. Suec. 383 (1761), Syst. Nat. i. 912; and other authors. *H. lutescens*, Steph. Ill. vi. 109 (not of Fab.). *H. affinis*, Steph. *l. c.* (1836). *H. paganus*, Steph. Ill. vi. 110 (not of Linné). *H. apicalis*, Steph. *l. c.* *H. maculatus*, Wesm. Bull. Acad. Brux. 1840, p. 215.

Pale yellow, the sides of the *prothorax* fuscous; *face* yellow; last joint of *palpi* fuscescent.

Abdomen pale yellow, with pale hairs. In the ♂, the appendices are broad, furcate at the apex; the prongs nearly equal and divergent, hairy, yellow; a callosity at the base (Pl. X. fig. 5*a*).

Legs pale yellow.

Wings elongate, hyaline, beautifully iridescent, scarcely tinged; *anterior pair* more or less clouded with gray, the apical and dorsal margins blotched with gray; usually with a small distinct black spot between the cubiti near the base; neuration (Pl. X. fig. 5) pale, with few black dots, which are most evident at the axillæ of the furcations; *gradate veinlets* brown, about seven in the outer series, and six in the inner, one or two near the base; three *sectors: posterior pair* hyaline, unspotted.

Length of body 2¼-3½ lines; expanse of wings 6½-9 lines.

Very abundant everywhere, throughout the year, except in the depth of winter.

Extraordinarily variable in size, and in the extent or absence of markings on the anterior wings. It may usually be separated by the isolated black spot near the base, but this is occasionally absent. Some examples are very dark, and bear considerable resemblance to *H. nervosus*.

Independent of coloration, it seems probable that two species may be here intermingled. In many dry examples, I find the appendices of the males longer, dilated at the apex, but scarcely furcate. A careful comparison of living examples is necessary in order to settle the question.

North American specimens do not differ from the described European form.

7. Hemerobius marginatus, Stephens.

Hemerobius marginatus, Steph. Ill. vi. 109 (1836).
H. flexuosus, Hag. Stett. Zeit. 1858, p. 131 (not described).

Pale primrose-yellow, *face* and *antennæ* concolorous; *palpi* with the terminal joint blackish; sides of the *prothoraæ* fuscescent.

Abdomen pale yellow, with pale hairs. In the ♂, the *appendices* form two broad, hairy, concave, obtuse, semitransparent yellow lobes, the upper margins of which are slightly turned inwards (Pl. X. figs. 6-6*a*). In the ♀, the abdomen is obtuse.

Legs very pale yellow; tarsi brownish at the tips.

Wings broad, the apical margin very oblique; pale whitish-hyaline, with a yellowish tinge: *anterior pair* usually with large fuscous blotches along the apical and dorsal margins, and often with indistinct transverse grayish fasciæ along the gradate veinlets; or these wings are almost entirely without markings (these specimens are usually males); neuration almost colourless, the costal veinlets and longitudinal veins sparingly streaked with dark fuscous, all the gradate veinlets dark fuscous; three *sectors;* about eight veinlets in the inner and outer *gradate series;* two near the base: *posterior pair* colourless, the pterostigmatical region slightly yellowish.

Length of body 3½-4 lines; expanse of wings 8½-9 lines.

Not common, but occasionally met with in summer.

This insect has much the appearance of *H. humuli*, but is very distinct, as is proved by the form of the male appendices, and also by the shape of the wings, &c.

The species has never hitherto been properly described, though it has been duly separated by Neuropterists; thus in Zeller's collection, I find it with the MS. name "*diversus*" of Schneider, and I have received it from Brauer as "*superbus*," n. s.

8. Hemerobius limbatus, Wesmael.

Hemerobius limbatus, Wesm. Bull. Acad. Brux. 1840, p. 215; Brauer, Neurop. Aust. 57. *H. subfasciatus*, Steph. Ill. vi. 111 (1836). *H. irroratus* (Leach), Steph. *l. c.* and *H. stigma*, Steph. Ill. vi. 112, according to Stephens' collection. *H. limbatellus*, Zett. Ins. Lapp. 1050 (1840), ?.

Unicolorous, brownish or blackish-brown; *antennæ* brown, with scarcely evident narrow pale annulations.

Abdomen brown, with paler pubescence. In the ♂ the *appendices* are blackish or fuscescent, broad, deeply furcate, the prongs diverging, and each slightly curved at the tips in opposite directions; the upper prong slightly the longer, and crossing the corresponding prong of the other appendix (Pl. X. fig. 7).

Legs grayish-yellow, fuscescent at the knees and at the tips of the tarsi.

Wings longly and narrowly ovate, longly elliptical at the apex: *anterior pair* grayish or brownish, with short gray streaks crossing the veins, the gradate veinlets margined with fuscous, more or less distinctly; the apical and dorsal margins generally broadly pale brownish, but varying greatly in this respect; longitudinal veins and costal veinlets pale, very closely pointed with fuscous; *pterostigma* brownish or reddish; three *sectors; gradate veinlets* dark fuscous, seven in the outer series, six in the inner, two near the base: *posterior pair* grayish-hyaline; pterostigma brownish; neuration unspotted, for the most part fuscescent, the sub-costa and radius more testaceous; the apical and dorsal margins frequently show a trace of the broad darker margination, as in the fore-wings.

Length of body 2½-3 lines; expanse of wings 7-8 lines.

Common throughout the summer, especially in firs and yews.

Excessively variable, and presenting numerous conditions which I have found it impossible to separate, either as distinct varieties or specific forms; the long and narrow wings seem to present the best character, together with the absence of distinct black or blackish spots.

All the types in Stephens' collection of *irroratus*, *stigma*, and *subfasciatus*, and many of those placed under *pini*, appear to belong to this species. In the "Entomologist's Annual" for 1858, Dr. Hagen has grouped many of these names as synonyms of what he describes as *phaleratus*, Hoffmansegg. This last is only a Museum name; the original description is by Schneider, in the "Arbeit. Schlesich. Gesells." 1846. I am quite unable to apply his description with certainty, though there can be little doubt that the species intended must be either *limbatus*, or one of the closely allied species. In the "Synopsis synonymica" Hagen gives *fasciatus* of Gözsy as a synonym of *phaleratus*, but types of the latter sent by Brauer do not accord with the descriptions of the former.

9. Hemerobius pini, Stephens.

Hemerobius pini (Leach), Steph. Ill. vi. 111 (1836). *H. punctatus*, Gözsy, Sitz. Akad. Wiss. 1852, p. 346, ?.

Yellowish testaceous, shining; the *face*, sides of the *pro-* and *meso- thorax*, and the greater part of the *metathorax* brown, with pale hairs; the prothorax longer than in the allied species, the posterior angles produced strongly downwards, obtuse and dilated, with a tuft of long hairs at the tips; *antennæ* yellow, with close blackish annulations.

Abdomen (♀) fuscescent, with a yellow lateral line.

Legs yellowish; the terminal joint of the tarsi fuscescent.

Wings somewhat elongate, oval, longly elliptical at the apex: *anterior pair* testaceous, the apical and dorsal margins darker; two broad blackish fuscous transverse fasciæ along the gradate veinlets, scarcely reaching the dorsal margin, the inner one is more or less connected at its lower end with a basal blotch, forming an abbreviated fascia; the outer fascia is generally formed

of two disconnected spots; the costal veinlets and the sub-costa and radius blackish fuscous, with short pale interruptions; the rest of the longitudinal veins pale, with closely placed blackish points; fuscous blotches, more or less distinct, along the radius; three *sectors; gradate veinlets* blackish, six to seven in the outer series, six in the inner, and others at the base; *pterostigma* reddish-brown: *posterior pair* paler, whitish, very iridescent; *pterostigma* long, dark reddisk-brown; costal veinlets and radius, and sub-costa wholly blackish; the other longitudinal veins blackish in part, otherwise pale; gradate veinlets mostly blackish.

Length of body $2\frac{1}{4}$-$2\frac{3}{4}$ lines; expanse of wings 7-8 lines.

I have not seen males that I can confidently refer to this species.

There are three or four specimens in the British Museum, all similar, and one of them bears the label "*pini;*" these are probably those from Scotland referred to by Stephens; all the other examples I refer to *limbatus*, and these are probably from Hertford. Stephens' description agrees with Leach's examples, but not with his own. It is also in Mr. Dale's collection, and may be not uncommon.

It is possibly identical with *punctatus* of Gözsy, of which I have certified Austrian types; these latter, though variable, do not show the transverse fasciæ with such distinctness, and are, perhaps, slightly larger; but local influences may account for these slight differences.

10. Hemerobius atrifrons, n. s.

Bright yellow, the sides of the head and the three divisions of the thorax broadly shining fuscous, leaving the yellow ground colour as a pale median line; *face* shining black; *antennæ* yellow, with narrow dark annulations.

Abdomen dark fuscous, with the margins of the segments, and a line on each side, yellow; pubescence brown, or golden-brown. In the ♀ the *appendices* are similar to those of *H. limbatus*, but dark fuscous, with a yellow callosity at the base; the upper prong of the fork is probably slightly shorter, and thus equal with the lower.

Wings shorter and broader than in *H. limbatus*, the apex broadly elliptical: *anterior pair* whitish-hyaline; a few gray markings across the veins; the gradate veinlets broadly margined with fuscous, giving the appearance of two fuscous fasciæ, and many blackish spots at the base, at the axillæ of the furcations and on the longitudinal veins, these veins being otherwise whitish; costal veinlets more finely spotted; *gradate veinlets* black, seven to eight in the outer series, six in the inner, two near the base; three *sectors; pterostigma* scarcely indicated; the apical and dorsal portion of the wing without any evident margining: in the *posterior pair* the gradate veinlets, the greater part of the second sector and of the sub-costa and radius are blackish, and the rest of the longitudinal veins have black streaks in the apical half; neuration otherwise pale.

Length of body 2½ lines; expanse of wings 6-6½ lines.

Not unfrequent throughout the summer.

This is evidenty allied to the true *H. fasciatus* of Gözsy, and may be a form thereof; but the latter would appear to be larger and to have the wings longer (intermediate between the present insect and *limbatus* in this respect), with an absence of the sharply defined black spots, the markings taking the form of three or four more or less distinct transverse fuscous fasciæ. I have not met with British examples that I can confidently refer to *fasciatus*, which would seem to be a common species on the mountains of central Europe, judging from numerous specimens received from Zeller.

H. crispus (Leach), Stephens, may belong here as a pale form, but I cannot satisfactorily determine it from the single type.

There are four or five European species pertaining to the *limbatus* group; and one or more of these certainly occurs also in North America. I have specimens of *atrifrons* also from Prussia, Austria, etc.

11. Hemerobius subnebulosus, Stephens.

Hemerobius subnebulosus, Steph. Ill. vi. 107 (1836). *H. fuscus* (Leach), Steph. *l. c.* *H. nebulosus*, Steph. *l c.* (part). *H. obscurus* (Leach), Steph. Ill. vi. 108. *H. nervosus*, Steph. *l. c.* (not of Fab.). *H. perelegans*, Steph. Ill. vi. 109, var.

Head and *thorax* rusty ochreous, broadly shining blackish on the sides, and with a narrow blackish median longitudinal line; *face* shining black; *antennæ* ochreous, closely annulated with blackish.

Abdomen dull brown, with golden hairs. In the ♂ the *appendices* are broad and band-like, dilated and truncated, the apex produced downwards into a narrow slightly-curved spine-like appendage, the tip of which is furnished with a tooth like the barb of a fish-hook, only that it is placed externally (Pl. X. fig. 8). In the ♀ the apex of the abdomen is obtuse.

Legs yellowish, the anterior and intermediate femora, tibiæ, and tarsi broadly annulated with blackish fuscous.

Wings rather elongated, the apex elliptical: *anterior pair* pale grayish fuscous, with numerous narrow angulated transverse whitish lines, the gradate veinlets margined with dark fuscous, simulating fasciæ, and some strong fuscous spots along the lower cubitus; the dorsal margin pale, slightly ochreous at the base; costal margin with pale spots; longitudinal veins and costal veinlets blackish, with numerous whitish interruptions; hairs pale; three *sectors; gradate veinlets* strong and black, six to seven in the outer series, six in the inner, two or three at the base; *post-costal cellules* both closed; *pterostigma* indistinct: *posterior pair* iridescent, pale grayish; the veins darker.

Length of body 3-3½ lines; expanse of wings 7½-9 lines.

Excessively abundant throughout the summer, especially about London, hiding in the chinks of the bark of fruit-trees, etc.

Varies considerably in intensity; sometimes the wings are uniformly almost blackish-fuscous, at others they are pale, with an appearance of many dark irrorations, and in this state more resemble *H. nervosus*. It may be always distinguished by the peculiar form of the male appendices.

I have never seen a continental example, nor is it known as such by Hagen or Brauer; yet the description of *H. strigosus*, Zett. (Ins. Lapp. 1048) suits the insect tolerably well. I can scarcely believe that a species so common in England should be peculiar to our islands.

The variety *perelegans* is a most beautiful form, in which the wings are strongly suffused with fuscous, with pale spots on the margins. I had previously wrongly

referred this variety to *limbatus*. In the collection of the British Museum a second insect has been placed with Stephens' unique type under the same label. This second example is really a very dark *limbatus*, but not so the first. I have a specimen that I took at Rannoch, in 1865, which agrees almost entirely with the type. Both examples are females, but I believe I am correct in referring them to *subnebulosus*.

12. Hemerobius nervosus, Fabricius.

Hemerobius nervosus, Fab. Ent. Syst. ii. 85 (1793), and other authors. *H. nebulosus*, Steph. Ill. vi. 107 (1836), part. *H. conspersus*, Burm. Handb. ii. 974 (1839). *Mucropalpus distinctus*, Ramb. Névrop. 421 (1842); Costa, Faun. Nap. 9, pl. x. fig. 6.

Ochreous, the sides of thorax broadly shining blackish; a narrow median blackish horizontal line; *face* shining blackish; *antennæ* yellow, with narrow fuscous rings.

Abdomen dark fuscous, with pale golden hairs, and a reddish lateral line in the ♀. In the ♂ the *appendices* are yellow, blackish at the tips, long, regularly curved, band-like or sub-cylindrical, slightly acuminate and obtuse (Pl. X. fig. 9). In the ♀ the apex of the abdomen is obtuse, or sub-truncate.

Legs pale yellowish; tarsi fuscous at the tips; anterior and intermediate tibiæ semi-fasciated, owing to fuscous marks which appear externally only, and are not continued beneath.

Wings elongate, elliptical at the apex: *anterior pair* whitish, clouded with grayish-cinereous, and strongly spotted with dark fuscous, especially about the gradate veinlets and towards the dorsal margin; margins fuscous and whitish in alternate spaces; longitudinal veins and costal veinlets black, strongly interrupted with white, hairs whitish; three *sectors*; *gradate veinlets* black, seven in the outer series, six in the inner, and three or four towards the base; second *post-costal cellule* open: *posterior pair* with blue iridescence, hyaline, the margins often grayish; veins for the most part black, but some of them with long white spaces.

Length of body 3-3¼ lines; expanse of wings 8-9 lines.

In Britain not nearly so common as *H. subnebulosus*, and decidedly unfrequent about London. A very abundant continental species.

Varies greatly in the number and size of the black irrorations.

Section 3. *Four* (*exceptionally five*) *sectors in the anterior wings* (Pl. X. fig. 10).

13. Hemerobius concinnus, Stephens.

Hemerobius concinnus, Steph. Ill. vi. 106, pl. xxx. fig. 3 (1836); Hag. Ent. Ann. 1858, p. 28. *H. hirtus*, Burm. Handb. ii. 975 (not of Linné). *H. cylindripes*, Wesm. Bull. Acad. Brux. 1840, p. 218; Brauer, Neurop. Aust. 56. *H. atomarius*, Gözsy, Sitz. Akad. Wiss. 1852, p. 346.

Unicolorous yellow; *face* sometimes inclining to piceous.

Abdomen ochreous-yellow, slightly brownish, with golden hairs. In the ♂ the *appendices* are broad, yellow, pointed, with a tooth on the middle of their lower edge (Pl. X. figs. 10 *a*, 10 *b*). In the ♀ the apex of the abdomen is armed with a long, flattened, slightly acuminate, obtuse borer, the apex of which is often curved upwards in dry examples (Pl. X. fig. 10 *c*).

Legs yellow, the tarsi brownish; tibiæ cylindrical, not spindle-shaped as in the rest of the species.

Wings very broad, and broadly rounded: *anterior pair* with the costal area very broad, dull yellowish, the apical margin spotted with fuscous, and with an appearance of two fuscous transverse fasciæ following the gradate veinlets; the membrane slightly clouded with pale grayish; neuration pale, the costal veinlets and all the longitudinal veins, except the sub-costa, regularly dotted with blackish points, with long pale hairs; *gradate veinlets* dark fuscous, eight or nine in the outer series, six to eight in the inner, continued further towards the base of the dorsal margin by two or three others, two rows of three or four at the base; four (exceptionally five) *sectors*: *posterior pair* paler, without markings, costal margin darker, only the costal veinlets dotted, outer gradate series with seven veinlets, inner with two, whereof that nearest the dorsal margin is conspicuously blackish.

Length of body 3½-4 lines; expanse of wings 9-11 lines.

Usually very rare, but found abundantly in the summer of 1867, by Mr. Barrett, in fir-trees, in Woolmer Forest, Hampshire. It is the largest European species.

Hagen (in "Hemerobidarum Synopsis Synonymica") refers this to *lutescens* of Fabricius, but it now appears to me impossible that the latter insect can be equivalent to our *concinnus*; "magnitudo et statura præcedentium (our *Sisyra fuscata*), alæ omnes albæ punctis strigisque fere indistinctis, fuscis." That Fabricius could have compared the largest European species with *Sisyra fuscata* in point of size is impossible, and I consider his *lutescens* as far more likely to be identical with our *micans*. Burmeister's *lutescens* is, no doubt, *micans*; that of Rambur is probably *humuli*, as is also that of Zetterstedt.

Genus VI. Megalomus, Rambur.

General characters similar to those of *Hemerobius*; the *anterior wings* broader and more strongly rounded at the apex; the *costal area* broader at the base; the sectors more numerous; and the margins and veins strongly ciliated. In the *posterior wings* the costal margin at the extreme base is elevated into a sort of broad tooth which carries a tuft of long hairs (Pl. X. fig. 11).

Rambur includes *Drepanepteryx phalœnoides* in *Megalomus*, but that insect has sufficiently trenchant characters to form a separate genus.

1. Megalomus hirtus, Linné.

Hemerobius hirtus, Linn. Faun. Suec. 382 (1761), Syst. Nat. i. 912; and other authors. *H. fimbriatus*, Curt. Brit. Ent. pl. ccii (1828); Steph. Ill. vi. 113. *Megalomus tortricoides*, Ramb. Névrop. 419 (1842).

Fuscous, strongly pilose.

Antennæ fuscous, the two basal joints ochreous.

Prothorax with an ochreous spot on each side. *Mesothorax* veined with ochreous in such a manner as to form two rings, filled in with a pupillate spot of the dark ground colour.

Abdomen dark blackish fuscous, marked with ochreous at the base.

Legs pale ochreous; *femora* fuscescent; anterior and intermediate tibiæ fuscescent at the apex, and slightly so at the base; posterior tibiæ fuscescent in the basal third, otherwise ochreous; the terminal joint of all the *tarsi* fuscescent.

Wings slightly ochreous, sub-hyaline; *anterior wings* transversely clouded with grayish fuscous, especially on the apical margin; *neuration* with whitish and blackish spaces in regular alternation; seven *sectors;* twelve veinlets in the outer *gradate series,* six in the inner, and about five towards the base: *posterior wings* whitish, iridescent, broadly margined with grayish fuscous; *neuration* mostly pale on the disk, and fuscous on the margin.

Length of body 3 lines; expanse of wings 7 lines.

Very rare. The above description is made from the example figured by Curtis, which was taken on the 1st July, 1825, at Duddingston, near Edinburgh, by Mr. J. C. Dale. Another example is in the British Museum, and probably one or two other native specimens are in existence.

The appendices of the male are not prominent, but there would appear to be a broad rounded dorsal and ventral plate at the apex of the abdomen. Mr. Dale's example would seem to be a female, in which the abdomen is simply obtuse at the apex, and I have only seen Continental males. Possibly several species of the genus exist in Europe; but, excepting the one with which ours seems to be identical, they are little known. Linné's type still exists in his collection, and bears the label "*hirtus*" in his own handwriting; it agrees in every particular with the English examples.

Genus VII. Drepanepteryx, Leach.

In general character similar to *Hemerobius,* but more robust in form; the last joint of the *maxillary palpi* stronger, only slightly acuminated.

Wings falcate, the apical margin strongly excised, especially in the anterior pair. The *costal area* of the *anterior wings* is very broad at the base, the *costal veinlets* very numerous, and united by two longitudinal rows of connecting veinlets; *sectors* extremely numerous; three complete series of *gradate veinlets;* neuration and margins very shortly ciliated. The costal margin of the *posterior wings* has a similar elevation to that in *Megalomus.*

1. Drepanepteryx phalænoides, Linné.

Hemerobius phalœnoides, Linn. Faun. Suec. 383 (1761); Syst. Nat. i. 912; and other authors. *Drepanepteryx pha-*

lœnoides, Steph. Ill. vi. 100, pl. xxiii. fig. 1. *Drepanopteryx phalœnoides*, Burm. Handb. ii. 975; Brauer, Neurop. Aust. 55. *Megalomus phalœnoides*, Ramb. Névrop. 418.

Dull ochreous, scarcely pubescent, the head bright ochreous; the whole of the under-surface of the body paler.

Antennæ fuscescent, ochreous at the base; *palpi* ochreous.

Legs ochreous.

Anterior wings opaque, testaceous, a whitish wedge-shaped spot on the middle of the dorsal margin strongly margined with fuscous; transverse costal fuscous streaks, the disk slightly reticulated with fuscous, two narrow transverse fuscous fasciæ including the gradate veinlets, and a longitudinal fuscous streak running from the inner series into the apex, a fuscous spot on the disc, rather towards the base; apical sinuations with a narrow whitish margin; dorsal margin fuscous, especially at the base: *posterior wings* sub-hyaline, slightly testaceous, especially at the apex.

Length of body 4 lines; expanse of wings 13-16 lines.

Very rare. A few specimens have been taken in the North of England and South of Scotland. I possess one example recently taken at Windermere by Mr. Strouvelle.

Family II. CONIOPTERYGIDÆ.

Antennæ short, hairy. *Maxillary palpi* with the four first joints short and nearly equal, the terminal joint long and slender. *Labial palpi* with two small basal joints, and a large broad and compressed terminal. *Ocelli* absent. *Wings* equal or unequal; in the *anterior wings* not more than two *costal veinlets*, one at the base, the other at the apex; *costal area* very narrow; *sub-costa* parallel with the costa; the *radius* runs parallel with the sub-costa, and emits two *sectors*, which fork before joining the margin; transverse discal veinlets very few, margins not visibly ciliated.*

Legs moderately long; first joint of the *tarsi* long, the three next short and somewhat cordate, the fifth short and slender; *ungues* simple.

* Under a high power, the margins and veins shew a few moderately strong hairs, and similar but shorter hairs are sparingly distributed over the membrane.

The whole insect is covered with a whitish powder, which, under a very high magnifying power, has the appearance of minute irregularly rounded granules, very slightly attached.

Larva with a small head and thoracic segments, and large dilated abdomen, attenuated posteriorly; lives apparently upon *Cocci*, and allied insects; spins an orbicular cocoon of fine white silk. This larva was discovered by Mr. Haliday (see Curtis' "British Entomology," pl. 528, and Westwood's "Modern Classification," vol. ii. p. 49), and has also been noticed by Dujardin.

These curious little insects were once placed by authors in the *Homoptera*, and also in the family *Psocidæ* among *Neuroptera:* but, as Westwood has shewn, their true position is undoubtedly that here allotted to them.

Genus I. Coniopteryx, Haliday.

(=*Coniortes*, Westwood; *Malacomyza*, Wesmael; *Sciodus*, Zetterstedt; and probably also *Aleuronia*, Fitch.).

The characters of the genus are those of the family.

1. Coniopteryx psociformis, Curtis.

Coniopteryx psociformis, Curt. Brit. Ent. pl. dxxviii. fig. 1-8, and text (1834); Steph. Ill. vi. 117; Burm. Handb. ii. 772; Hag. Ent. Ann. 1858, p. 30. *C. aphidiformis*, Ramb. Névrop. 316 (1842) ?.

Antennæ with about forty joints, much longer than the body. *Wings* very unequal, the posterior pair being very small (Pl. XI. fig. 1).

Expanse of wings $3\frac{2}{3}$-$4\frac{1}{2}$ lines.

Common throughout the summer.

2. Coniopteryx tineiformis, Curtis.

Coniopteryx tineiformis, Curt. Brit. Ent. pl. dxxviii. fig. 9, and text (1834); Westw. Introd. fig. 65, 1-8; Steph. Ill. vi. 116; Ramb. Névrop. 316; Brauer, Neurop. Aust. 55; Hag. Ent. Ann. 1858, p. 29. *Malacomyza lactea*, Wesm. Bull. Acad. Brux. 1840, pp. 166, 244, pl. vi. fig. 3, pl. vii. fig. 2. *Sciodus lacteus*, Zett. Ins. Lapp. 1051 (1840).

Antennæ about the length of the body, with about twenty-five joints. *Wings* sub-equal, slightly smoky gray. *Abdomen* rather short, ochreous (Pl. XI. fig. 2).

Expanse of wings $2\frac{1}{2}$-$2\frac{3}{4}$ lines.

Not uncommon in summer, especially in fir trees.

This species is decidedly more gray than the others; the shortness of the antennæ and the ochreous abdomen also distinguish it from *aleyrodiformis*, which is larger.

3. Coniopteryx aleyrodiformis, Stephens.

Coniopteryx aleyrodiformis, Steph. Ill. vi. 116 (1836); Hag. Ent. Ann. 1858, p. 29.

Antennæ with more than thirty joints, longer than the body. *Wings* sub-equal, broad, the neuration tolerably distinct. *Abdomen* thin.

Expanse of wings $3\frac{1}{2}$-$3\frac{2}{3}$ lines.

Probably equally common with the last; but I cannot say that I have personally noticed it.

These insects are as yet ill-understood, and I regret that the subject can receive no elucidation from me. Hagen, on the authority of an observation made by Zeller (Stett. Zeit. 1859, p. 38), thinks it possible that *psociformis* and *tineiformis* may be the sexes of one species. I cannot confirm or disprove this, never having seen the insects *in copulâ*, but I have certainly found *psociformis* abundantly when *tineiformis* was not to be seen. Rather am I inclined to think, from the formation of the abdomen, that *tineiformis* and *aleyrodiformis* may be only sexual forms of one species. It may be remarked, however, that, according to information furnished by Brauer, three distinct larvæ, pertaining to this genus, are found in Austria. *

One or more species were certainly known to the old authors, but it is impossible to apply their descriptions with certainty; though probably *tineiformis* was the insect they had in view. None of them mention the disparity

* I have recently received from Mr. Haliday a very minute and interesting species, taken in Italy. A short diagnosis is appended.

Coniopteryx hæmatica (Hal. MS.).

Obscure testacea, abdomine aurantiaco. Antennæ albido-flavæ, corpore paulo longiores. Thorax maculis utrinque nigro-fuscis. Pedes pallide testacei. Alæ sub-æquales, fuscescentes, sub-hyalinæ, vix pulverulentæ, venis fuscis.

Long. corp. $\frac{2}{3}$ lin., exp. alar. $1\frac{1}{2}$-$1\frac{3}{4}$ lin.—Hab. Italia.

in the wings, so noticeable in *psociformis*. The following descriptions apply to species of *Coniopteryx*—*Hemerobius parvulus*, Müller, Faun. Fridrichsd. 66 (1767); *Semblis farinosa*, Rossi, Mant. Faun. Et. ii. 105 (1794); *Phryganea alba*, Fabricius, Ent. Syst. Suppl. 201 (1798); and Müller correctly estimated the position of his insect, in which some of the more modern authors shewed less keen perception.

Family III. CHRYSOPIDÆ.

Antennæ setiform, long. Terminal joint of the *palpi* cylindrical, not subulate. *Ocelli* absent. *Eyes* brilliant. *Wings* sub-equal; *costal veinlets* simple; *sub-costa* and *radius* separated to the apex; *sub-costal area* with one transverse veinlet near the base,* and several near the apex under the pterostigma; *radius* starting from the sub-costa at about a quarter of its length from the base, formed, as it were, of many little veins directed upwards and downwards alternately; a row of cellules between it and the sub-costa; it emits numerous *sectors*, some of which join the cubitus anticus, but most run into the apical portion of the wing, where they end simply or in a furcation; beyond the middle the sectors are united by two rows of *gradate veinlets*; the *cubitus anticus* starts from the sub-costa still nearer the base, and runs straight to the anal portion of the apical margin; the *cubitus posticus* starts from the extreme base of the sub-costa, and runs parallel with the cubitus anticus, but is alternately broken like the radius; it sends off numerous branches to the dorsal margin; between the two cubiti is a row of transverse *cubital cellules*, whereof the *third* is divided into two by a longitudinal veinlet;† the *post-costa* starts from the base of the wing, and joins the dorsal margin soon afterwards.

Body slender; more robust in the female; appendices not evident.

Legs slender; the *ungues* generally strongly curved and dilated internally at the base (Pl. XI. fig. 4 *b*), but sometimes simple (Pl. XI. fig. 4 *a*).

Larva, as a rule, not covering its body with the débris of its prey.‡

* In the exotic genus *Apochrysa* this veinlet is absent.

† In *Apochrysa* this veinlet is absent.

‡ Schneider (Mon. Chrys. p. 56) says, he has never observed these larvæ use the skins of their prey as a covering; but this does take place in some species.

Eggs placed on a long pedicle.

These beautiful insects, familiarly known as "Golden Eyes," have long been notorious for the aptitude which some of them possess for emitting, when handled, a most disagreeable smell of ordure (hence they are sometimes called "Stink Flies") which is retained by the fingers long afterwards. But I am of opinion that this propensity has been very greatly exaggerated, and that it is shown only by certain species, and by them only at certain times. I have had many hundreds of living examples through my hands, and can safely assert that it was only exceptionally that they left any odour behind; though, when this did take place, it was extremely nauseous. *C. septempunctata* is the greatest delinquent in this respect, for I rarely handle a specimen of this species without its leaving a reminder which any amount of washing will not immediately remove.

I divide the British species, formerly placed in *Chrysopa*, into two genera; not because this is rendered necessary for the determination of our insects, but because the large and rapid accumulation of forms from all parts of the globe (nearly 150 species are already described) makes it imperative that some division should be made. The two genera will now stand as follows:—

1. Chrysopa, Leach.

Labrum more or less rounded in front.

Third cubital cellule in the anterior wings divided unequally (Pl. XI. figs. 3 and 4, indicated at *c c*), the upper portion being small, and more or less ovate. Colour more or less green.

2. Nothochrysa, n. g.

Labrum more or less excised in front.*

Third cubital cellule in the anterior wings divided nearly equally (Pl. XI. fig. 5, indicated at *c c*), the two portions being nearly elongate-quadrate, the two rows of gradate veinlets less parallel. Colour more or less reddish or yellowish. Form more robust.

* Curtis, in his "British Entomology," plate 520, gives the excised labrum as a character for the whole of the genus *Chrysopa* as it then stood, and thus figures it (fig. 2) in his dissections; but if these dissections are intended to apply to his *C. abbreviata*, he is certainly in error; Stephens (Ill. vi. 101) makes the same mistake.

It is unnecessary to give detailed characters for each genus, as they would be little more than a repetition of those noticed in the description of the family.

Genus I. Chrysopa, Leach.

The eleven native species of *Chrysopa*, as here restricted, may be tabulated thus :—

A. Second joint of the antennæ concolorous with the basal.
  a. Costal margin of anterior wings sensibly excised. *C. flava*.
  a. *a*. Costal margin not sensibly excised.
    b. The partition-veinlet of the third cubital cellule ends before the insertion of the transverse veinlet above it (Pl. XI. fig. 3, indicated at *c*. *c*.) . . . . *C. vulgaris*.
    b. *b*. The partition-veinlet ends after the insertion of the above-mentioned veinlet (Pl. XI. fig. 4, indicated at *c c*).
      c. A black spot between the basal joints of the antennæ.
        d. A black dot at the extreme base of the costa in anterior wings.
          e. Abdomen wholly green. *C. aspersa*.
          e. *e*. Abdomen black beneath. *C. ventralis*.
        d. *d*. No black dot at base of costa. *C. septempunctata*.
      c. *c*. No black spot between the basal joints of the antennæ.
        f. Palpi annulated with blackish. *C. flavifrons*.
        f. *f*. Palpi unannulated.
          g. Expanse of wings about 21 lines. *C. vittata*.
          g. *g*. Expanse of wings about 14 lines. *C. alba*.

A. A. Second joint of the antennæ marked with black or fuscous.
  a. Colour full green.

b. Ungues dilated at the base (Pl. XI. fig. 4 *b*). . . *C. abbreviata.*
b. b. Ungues simple (Pl. XI. fig. 4 *a*). *C. phyllochroma.*
a. a. Colour blue-green. . . . . *C. perla.*

Too much reliance must not be placed upon this tabular arrangement, as it will not determine species that may occur with us, though not yet discovered; attention must be paid to the detailed descriptions. Most of the species lose their colour very rapidly after death.

1. Chrysopa flava, Scopoli.

Hemerobius flavus, Scop. Ent. Carn. 270 (1763); *Chrysopa flava*, Hag. Ent. Ann. 1858, p. 20. *C. subfalcata*, Steph. Ill. vi. 105 (1836). *C. vittata*, Schn. Mon. Chrys. 65, pl. vi. fig. 1, larva, pl. vii. imago, (not of Wesm.); Brauer, Neurop. Aust. 60.

Pale green; dorsal surface of thorax and abdomen with a yellowish longitudinal line in the middle.

Antennæ shorter than the wings, becoming obscure towards the apex; the basal joint shorter than the head. *Vertex* raised, the elevated portion somewhat triangular, the apex being extended between the basal joints of the antennæ. The head is quite immaculate.

Prothorax rounded at the sides, rather narrowed anteriorly; immaculate.

Abdomen slightly pubescent.

Legs nearly colourless; *ungues* brown, dilated at the base internally.

Wings elongate, apex acute. *Anterior wings* with the costal margin strongly excised after about one-fourth of its length from the base. *Neuration* almost wholly pale; the costal veinlets in the basal portion blackish at their points of junction with the sub-costa; some of the other basal veinlets also blackish; *pterostigma*, in all the wings, scarcely darker, elongate. In the *posterior wings* the costal veinlets are mostly half blackish; other veins and veinlets pale.

After death, the colour becomes uniformly pale yellow.

Length of body 6-7 lines; expanse of wings 17-22 lines.

A common insect in summer, especially in trees bordering streams.

The excised costal margin of the anterior wings will readily separate this species.

2. Chrysopa vittata, Wesmael.

Chrysopa vittata, Wesm. Bull. Acad. Brux. 1840, p. 211; Hag. Ent. Ann. 1858, p. 21, Stett. Zeit. 1858, p. 131, 1859, p. 412. *Hemerobius albus*, Fab. Syst. Ent. 309 (not of Linné); *Chrysopa alba*, Burm. Handb. ii. 918; Brauer, Haid. Abh. 1850, p. 6. *C. perla*, (Leach), Steph. Ill. vi. 105 (not of Linné); Evans, Tr. Ent. Soc. v. 78, pl. ix. fig. 4. *H. proximus*, Ramb. Névrop. 425 (1842). *C. integra*, Hag. Stett. Zeit. 1852, p. 40.

Very similar to *C. flava*, but instantly separated by the somewhat rounded costal margin of the anterior wings; the basal joint of the *antennæ* is longer; the *maxillary palpi* marked with fuscous, especially the terminal joint; the prothorax has a small blackish mark at the margin of the anterior angles; the *wings* are broader, the *neuration* of all the wings wholly pale, excepting about four or five cubital veinlets near the base, which are black.

After death, the abdomen has a strong tendency to turn blackish.

Length of body 6-7 lines; expanse of wings 19-22 lines.

Appears in summer; according to my experience not so common as *C. flava*.

This and the preceding species are almost constantly mixed in collections.

3. Chrysopa alba, Linné.

Hemerobius albus, Linn. Faun. Suec. 382 (1761), Syst. Nat. i. 911; *Chrysopa alba*, Steph. Ill. vi. 104; Evans, Tr. Ent. Soc. v. 78, pl. ix. fig. 1; Schn. Mon. Chrys. 77, pl. xiii; Brauer, Neurop. Aust. 60; Hag. Stett. Zeit. 1852, p. 40, Ent. Ann. 1858, p. 22. *C. ciliata*, Wesm. Bull. Acad. Brux. 1840, p. 212.

Very pale whitish green.

Head small, immaculate. *Vertex* raised, with a depression in the middle in front. *Antennæ* and *palpi* concolorous with the head, not marked.

Prothorax immaculate; the anterior angles rounded; a transverse raised line rather behind the middle, and the posterior margin also raised.

Abdomen slightly pubescent.

Legs very pale; *unques* brown, very strongly curved, the basal portion much dilated internally.

Wings short and broad, apex scarcely acute. *Anterior wings* (Pl. XI. fig. 4) with almost all the *neuration*, excepting the longitudinal veins and sectors, blackish: in the *posterior wings*, only the costal veinlets, those between the sub-costa and radius, and some of the gradate veinlets, blackish; the rest pale, almost colourless.

After death, the colour changes to very pale whitish-yellow.

Length of body 3½-4½ lines; expanse of fore-wings 11-15 lines.

A common species in summer, in woods. Remarkable for its very pale and fugitive colour.

4. Chrysopa flavifrons, Brauer.

Chrysopa flavifrons, Brauer, Haid. Abh. 1850, p. 6, pl. i. fig. 2; Neurop. Aust. 60; Hag. Ent. Ann. 1858, p. 22.

Pale green, front yellowish.

Head with the *vertex* unspotted, inflated, but the raised portion is flattened, or even slightly concave; *front* with a reddish or reddish-fuscous line on each side; *palpi* broadly annulated with blackish, the terminal joint wholly blackish; *antennæ* shorter than the wings, the basal joint short, strongly inflated.

Prothoraæ with an irregular reddish or reddish-fuscous mark on each side of the middle above, and with slight markings at the sides of the anterior and posterior angles; broad, the sides strongly rounded, a transverse raised space rather behind the middle, the posterior margin divided in the middle by an impressed line; with a few blackish hairs, especially on the sides.

Abdomen with pale pubescence.

Legs pale, the tarsi somewhat yellowish; *ungues* brown, long, the basal portion dilated internally, the curved portion distant from it.

Wings broad, the apex scarcely acute. *Neuration* of the *anterior wings* with each costal veinlet black at each end, green in the middle; sub-costal basal veinlet, gradate veinlets wholly, and cubital veinlets at each end, black; *pterostigma* dark green. *Posterior wings* with the costal veinlets wholly black, the others as in the anterior.

After death, changes to yellow, the veins greenish.

Length of body 4-5 lines; expanse of wings 14-15 lines.

Not a common species. I have taken odd specimens at various times, chiefly about Mickleham, in autumn.

5. Chrysopa vulgaris, Schneider.

Chrysopa vulgaris, Schn. Mon. Chrys. 68, pl. vi. fig. 2, larva, pl. viii, imago (1851); Hag. Stett. Zeit. 1852, p. 40, Ent. Ann. 1858, p. 21; Brauer, Neurop. Aust. 59; Ed. Pict. Névrop. d'Esp. 59. *Hemerobius perla*, Fab. Syst. Ent. 82 (not of Linné); Scop. Ent. Carn. 271; Schrk. Ins. Aust. 311; Ratz. Forst. iii. 247, pl. xvi. fig. 6; Ramb. Névrop. 424; Costa, Faun. Nap. pl. xi. fig. 1; *Chrysopa perla*, Burm. Handb. ii. 980; Wesm. Bull. Acad. Brux. 1840, p. 207; Brauer, Haid. Abh. 1850, p. 5, pl. i. fig. 1, imago, pl. ii. fig. 8, larva. *C. affinis*, Evans, Tr. Ent. Soc. v. 78, pl. ix. fig. 2 (1848).

Green, a broad yellow stripe along the dorsal surface of the thorax and abdomen.

The raised portion of the *vertex* flattened, extended between the basal joints of the antennæ, immaculate; *front* more or less suffused with deep flesh colour at the sides; *palpi* not marked with dark; *antennæ* not quite so long as the wings, the apical portion darker, the basal joint small, and often marked with reddish internally.

Prothorax longer than broad, angles rounded, divided into two divisions by a raised transverse space in the middle, the anterior portion flattened, the posterior with two raised oblique lines; clothed with sparse blackish hairs; nearly immaculate.

Abdomen clothed with sparse blackish hairs; the pale yellow dorsal line very conspicuous during life.

Legs green, with short blackish pubescence; *ungues* brown, long, the curved portion extending much beyond the dilated basal portion.

Wings narrow, elongate, scarcely acute; the partition-veinlet of the third *cubital cellule* does not reach the transverse veinlet above it; *neuration* wholly pale in all the wings, ciliated with black; *pterostigma* conspicuous, dark (Pl. XI. fig. 3).

After death, dull yellowish.

Hibernal condition: *C. carnea*, Steph. Ill. vi. 103 (1836); Evans, Tr. Ent. Soc. v. 78, pl. ix. fig. 6. *C. perla*, vars. *primaveria*, *incarnata*, and *rubropunctata*, Brauer, Haid. Abh. iv. 5.

The green colour becomes more or less reddish, still retaining the pale dorsal line, though often less conspi-

cuously. The whole head often suffused with dark flesh colour, and the abdomen frequently with dorsal and lateral rows of crimson or reddish spots.

Length of body 3-4 lines; expanse of wings 11-14 lines.

A very abundant species. It often causes a deposit of verdigris on the pin, which, in a few years, nearly destroys the specimen.

The pale dorsal line is a good character whereby to separate the species at sight. Certain individuals hibernate in thatch, rubbish, houses, &c., and all those taken in winter, or early spring, more or less assume a reddish tint. According to Brauer (*in litt.*) this form should be called a "condition" rather than a "variety," inasmuch as the specimens are ordinarily coloured on their first appearance, but change colour with the approach of colder weather.

6. Chrysopa septempunctata, Wesmael.

Chrysopa 7-punctata, Wesm. Bull. Acad. Brux. 1840, p. 210; Schn. Stett. Zeit. 1845, p. 345, Mon. Chrys. 101, pl. xxx; Hag. Stett. Zeit. 1852, p. 42, Ent. Ann. 1858, p. 23; Brauer, Neurop. Aust. 61; Ed. Pict. Névrop. d'Esp. 64. *C. angustipennis,* Steph. Ill. vi. 104 (1836), according to his collection. *Hemerobius mauricianus,* Ramb. Névrop. 425 (1842). *H. pallens,* Ramb. Névrop. 425 (according to Hag. Stett. Zeit. 1866, p. 298); *C. pallens,* Schn. Mon. Chrys. 104, pl. xxxii; Ed. Pict. Névrop. d'Esp. 64. *C. nobilis,* Brauer, Haid. Abh. 1850, p. 7, pl. i. fig. 4, imago, pl. ii. fig. 13, larva (not of Heyden).

Rather full green; front with black spots.

Head with the *vertex* immaculate, dilated, but depressed in the centre; a black spot between the basal joints of the antennæ (rarely absent); *front* with six black spots—two semilunate ones below the antennæ (these two are often absent); two, rounded, in the genæ below the eyes; two, elongate, placed one on each side of the clypeus; *palpi* somewhat testaceous; *antennæ* little shorter than the wings, pale brownish, excepting towards the base, basal joint short and inflated.

Prothorax short and broad, an impressed longitudinal line in the middle of the posterior portion; anterior angles marked with black.

Legs full green; *tarsi* brownish; *ungues* brown, strongly curved, the basal portion dilated and rounded.

Wings elongate, subacute; *neuration* full green; the costal and post-costal veinlets, the gradate veinlets (usually), those between the radius and the sector at the upper end only, and several cubital veinlets, black; *pterostigma* elongate, dark: in the *posterior wings* the post-costal veinlets are green.

After death changes to greenish-yellow.

Length of body 5-6 lines; expanse of wings 15-18 lines.

Moderately common in summer, and especially entitled to the appellation of "Stink Fly."

I have not accorded to Stephens' name *angustipennis* the right of priority, although his types are certainly the species here described. My reason for not so doing is that the word "immaculate" in his description is so contradictory, that no one could possibly have recognized the species from that description; and I am unwilling to drop Wesmael's name—by which the insect is so well known.

Hagen (Ent. Ann. 1858, p. 22), gives *C. Heydenii* of Schneider, (*nigricostata*, Brauer), as a doubtful synonym for *angustipennis*, but that species is very different.

7. Chrysopa aspersa, Wesmael.

Chrysopa aspersa, Wesm. Bull. Acad. Brux. 1840, p. 210; Schn. Mon. Chrys. 112, pl. xxxvii; Hag. Stett. Zeit. 1852, p. 42, 1859, p. 412, Ent. Ann, 1858, p. 23; Ed. Pict. Névrop. d'Esp. 66. *Hemerobius prasinus*, Ramb. Névrop. 424 (1842). *H. Ramburii*, Costa, Faun. Nap. 14 (1855).

Full green, front spotted with black.

Head with the *vertex* inflated, nearly semicircular, flattened, immaculate; a large triangular black spot between the basal joints of the antennæ; *front* with a black spot on the genæ below each eye, and an elongate black spot on each side of the clypeus; *palpi* sharply annulated with black and white; *antennæ* shorter than the wings, pale grayish-brown, the two basal joints green, the first sometimes with a faint dark mark above.

Prothorax with a transverse raised line behind the middle; blackish-brown spots on each side of the middle,

forming somewhat interrupted longitudinal lines, and with three similarly coloured spots on each lateral margin; a few scattered black hairs. *Mesothorax* with two blackish-brown dots in the middle above.

Abdomen often with two indistinct lateral rows of blackish spots; clothed sparingly with black hairs.

Legs green, with blackish pubescence; *tarsi* brownish; *ungues* dilated at the base internally, the apical portion long and strongly curved.

Wings rather short, sub-acute; a black dot at the extreme base of the costa. In the *anterior wings* the longitudinal veins are green; the gradate veinlets black; all the other transverse veinlets black at each end and green in the middle; *pterostigma* elongate, green. In the *posterior wings* the costal veinlets are wholly black; neuration otherwise coloured as in the anterior.

After death changes to yellow.

Length of body 4 lines; expanse of wings 13-16 lines.

Tolerably common in summer in woods.

8. Chrysopa ventralis, Curtis.

Chrysopa ventralis, Curt. Brit. Ent. pl. dxx (1834); Steph. Ill. vi. 104; Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 6; Brauer, Neurop. Aust. 61; Hag. Stett. Zeit. 1858, p. 131, Ent. Ann. 1858, p. 23. *C. aspersa*, var. 7, Schn. Mon. Chrys. 112 (1851); Ed. Pict. Névrop. d'Esp. 67.

Almost entirely similar to the last; but the ventral surface of the abdomen, excepting the last segment, is black with pale transverse sutures; the costal veinlets of the anterior wings appear to be pale only at their junction with the costa.

Occurs rather frequently in woods in summer, often in company with *C. aspersa*, and may be instantly recognized by the black underside of the abdomen. Though inclined to consider it distinct from *aspersa*, I think it very desirable that its specific right should be proved by breeding from the larva.

9. Chrysopa abbreviata, Curtis.

Chrysopa abbreviata, Curt. Brit. Ent. pl. dxx (1834); Steph. Ill. vi. 133 (part); Wesm. Bull. Acad. Brux. 1840, p. 209; Evans, Tr. Ent. Soc. v. 78, pl. ix.

fig. 7; Schn. Mon. Chrys. 119, pl. xli (part); Hag. Stett. Zeit. 1852, p. 35, 1858, p. 131, 1859, p. 411, Ent. Ann. 1858, p. 24; Brauer, Neurop. Aust. 62. *C. immaculata*, Steph. Ill. vi. 103 (1836); Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 5. *Hemerobius chlorophanus*, Ratz. Forst. iii. 248 (1837).

Full dark green; vertex and face spotted with black.

Head with the *vertex* dilated, not flattened, somewhat triangular, the angles rounded; two black spots before the antennæ in the middle forming an interrupted semicircle, a black transverse line in the posterior portion sometimes interrupted, and often with a black spot at the posterior angles beneath the eyes; a very large black spot between the basal joints of the antennæ; *front* with a crescentic black spot round the lower edge of the basal joints, one or two spots on each side on the genæ, and a spot on each side of the clypeus; *palpi* annulated with black, the terminal joint almost wholly black; *antennæ* little shorter than the wings, brownish, the basal joint green with a blackish mark internally, second joint deep black.

Prothoraæ with a longitudinal impressed median line, the angles rounded; generally with an interrupted, narrow, impressed, transverse, median line, below each end of which is a black spot; sides with a narrow black line, and the base of the posterior coxæ circled with black; clothed with short black hairs, especially on the sides. *Meso-* and *meta-thoraæ* marked with blackish at the sides, and the sutures on the sternum narrowly black.

Abdomen rather thickly clothed with short black hairs, and sometimes with a black line on the sides.

Legs green, with short black hairs; *tarsi* slightly brownish; *ungues* deep brown, dilated at the base internally (Pl. XI. fig. 4 *b*).

Wings short and broad, rounded at the apex; *neuration* for the most part green, with long black hairs; in the *anterior wings* the costal veinlets at their lower end, those between the radius and sector at each end, the gradate veinlets mostly altogether, and several cubital nervules, are black; *pterostigma* dark green: in the *posterior wings* the costal veinlets almost totally, and those between the radius and sector at their upper ends only, are black.

After death changes to pale green.

Length of body 3-4 lines; expanse of wings 11-12 lines.

Occurs in woods in summer; apparently less frequent than the next, with which it is generally confounded in collections.

10. Chrysopa phyllochroma, Wesmael.

Chrysopa phyllochroma, Wesm. Bull. Acad. Brux. 1840, p. 207; Hag. Stett. Zeit. 1852, p. 43, 1858, p. 412, Ent. Ann. 1858, p. 24; Brauer, Neurop. Aust. 62. *C. abbreviata,* Steph. Ill. vi. 103 (part, according to his collection); Schn. Mon. Chrys. 119 (part). *C. pusilla,* Brauer, Haid. Abh. 1850, p. 7, pl. ii. fig. 4. *C. tenella,* Brauer, *l. c.* fig. 5.

In form and colouration, almost entirely similar to the last; in size slightly larger. May be at once separated by the *ungues,* which are simple and but slightly curved (Pl. XI. fig. 4 *a*). On the *vertex* the black transverse posterior line is usually absent.

Length of body 4-4½ lines; expanse of wings 12-13 lines.

Occurs in woods in summer, and is moderately common. I find the transverse veinlets partially black in both species (See Hagen, Ent. Ann. 1858, p. 24).

11. Chrysopa perla, Linné.

Hemerobius perla, Linn. Faun. Suec. 382 (1761), Syst. Nat. i. 911; *Chrysopa perla,* Schn. Mon. Chrys. 136, pl. vi. fig. 4, larva, pl. xlix. imago; Brauer, Neurop. Aust. 61; Hag. Stett. Zeit. 1858, p. 131, Ent. Ann. 1858, p. 24. *H. chrysops,* Fab. Syst. Ent. 309 (not of Linné); Zett. Ins. Lapp. 1048; Ramb. Névrop. 427. *H. cancellatus,* Schrk. Faun. Boic. ii. 189 (1802); *C. cancellata,* Wesm. Bull. Acad. Brux. 1840, p. 208. *C. maculata,* Steph. Ill. vi. 102 (1836); Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 4. *C. reticulata* (Leach), Steph. Ill. vi. 102 (1836); Burm. Handb. ii. 980; Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 3; Brauer, Haid. Abh. 1850, p. 7, pl. ii. fig. 6, imago, fig. 11, larva. *H. reticulata,* Ratz. Forst. iii. 247.

Blue-green, varied with black.

Head yellowish; *vertex* with a depression in the centre, the raised portion with a broad black margin, which is prolonged between the antennæ, and connected with a transverse line margining the posterior edge; front with a ∧-shaped black mark, the apex of which joins the vertical mark between the antennæ, a black spot on the genæ below the eyes, and a black line on each side of the clypeus; *palpi* black, pale at the articulations; *antennæ* shorter than the wings, brown, the basal joint yellowish, the second joint black.

Prothorax above, with two somewhat quadrate black spots on each side; insertion of the coxæ ringed with black; *meso-* and *meta-thorax* strongly marked with black on the sides, and lined with black beneath.

Abdomen black, more or less varied with blue-green, and with pale pubescence. The extent of black and green varies in the sexes, and also in individuals independently of sex.

Legs green, with short black hairs; *tarsi* brownish; *ungues* dilated at the base internally.

Wings short and broad, obtuse; *longitudinal veins* green, *transverse veinlets* all black and strong, ciliated with black; *pterostigma* darker.

Nearly loses its bluish tint after death.

Length of body 4-6 lines; expanse of wings 12-14 lines.

Very common, especially in woods, throughout the summer.

It is to me a matter of doubt whether Linné's description of *Hemerobius chrysops* does not refer to this insect rather than his description of *perla*, but Schäffer's figure (Icon. Insect. Ratisb. pl. v. fig. 7-8), quoted by him, well represents our *perla*.

Hagen, in the "Entomologist's Annual" for 1858, p. 22, introduces, doubtfully, *C. tenella*, of Schneider (Mon. Chrys. 94, pl. xxv.), on the authority of a specimen in the British Museum. Among some old doubtful specimens there, I cannot find one that agrees with Schneider's description of *tenella*, or with a continental example so named for me by Herr Brauer. It may, however, be assumed as certain that we possess more species than are here described.

Genus II. Nothochrysa, n. g.

(See p. 195).

1. Nothochrysa fulviceps, Stephens.

Chrysopa fulviceps, Steph. Ill. vi. 101, pl. xxx. fig. 2 (1836); Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 1; Schn. Mon. Chrys. 146, pl. liii; Hag. Ent. Ann. 1858, p. 24. *Hemerobius erythrocephalus*, Ramb. Névrop. 428, pl. ix. fig. 5 (1842).

Dark fuscous, head reddish-orange.

Head and basal joint of antennæ orange, the latter with a small fuscous mark internally; the rest of the *antennæ* blackish-fuscous; *palpi* dark fuscous.

Pro- and *meso-thorax* yellowish, dark fuscous at the sides; *meta-thorax* slightly yellowish in front.

Abdomen with a yellowish lateral line, the apex also yellowish, especially beneath.

Legs yellowish; *tarsi* fuscous; *ungues* dilated at the base internally.

Wings elongate, the anterior obtuse at the apex, the posterior acute; *neuration* all black, excepting the *marginal vein*, *sub-costa*, *radius*, and *cubitus posticus*, which are pale greenish-white; *pterostigma* long, obscured.

Length of body 6 lines; expanse of wings 19-23 lines.

South of England, in summer; always very rare.

2. Nothochrysa capitata, Fabricius.

Hemerobius capitatus, Fab. Ent. Syst. ii. 82 (1793); Guér. Iconog. 387, pl. lxii. fig. 4; *Chrysopa capitata*, Steph. Ill. vi. 102; Wesm. Bull. Acad. Brux. 1840, p. 212; Evans, Tr. Ent. Soc. v. 78, pl. x. fig. 2; Schn. Mon. Chrys. 144, pl. lii; Brauer, Neurop. Aust. 59; Hag. Ent. Ann. 1858, p. 25.

Piceous; head reddish orange.

Head and two basal joints of antennæ reddish orange, rest of the *antennæ* black; *palpi* blackish fuscous.

Prothorax obscure reddish orange.

Abdomen reddish at the apex.

Legs testaceous, the knees piceous; *ungues* slightly curved, simple.

Wings short, beautifully iridescent; *neuration* reddish fuscous; *pterostigma* reddish (Pl. XI. fig. 5).

Length of body 4-5 lines; expanse of wings 13-15 lines.

Appears in summer; scarce, but more frequently met with than the preceding species.

According to Schneider, both species are of rare occurence on the continent, though widely distributed. I have never seen either of them alive. In *fulviceps* the lower half of the third cubital cellule is frequently divided by a transverse veinlet.

The following South-European and exotic species, should be placed in *Nothochrysa*.—*Chrysopa italica*, Rossi (S. Europe); *C. stigmatica*, Rambur (S. Europe); *C. corsica*, Hagen (Corsica); *C. æqualis*, Walker (uncertain locality); *C. variegata*, Burmeister (Comoro Islands); *C. rufostigma*, M'Lachlan (S. Africa); *C. gigantea*, M'Lachlan (S. Africa); *C. neurodes*, Rambur (S. Africa; the third cubital cellule is not correctly delineated by Schneider); *C. tripunctata*,* M'Lachlan (Australia); *C. insignis*, Walker (Australia); *C. infecta*, Newman (Malabar); and perhaps others with which I am unacquainted.

A group of species, chiefly from tropical America, of which *C. varia* of Schneider may be taken as the type, distinguished by an excised labrum, very long antennæ, broad wings, graceful form, and generally pale colour, (often with rich markings), will form another genus, to which the name *Leucochrysa* may be applied.

Division III. PANORPINA.

Antennæ sub-setiform or filiform. *Head* small; *front* produced into a rostrum, which is deflexed vertically; *ocelli* present (*Panorpa*) or absent (*Boreus*); *mandibles* usually toothed internally. *Prothorax* narrow and transverse. *Meso-* and *meta-thorax* large. *Abdomen* subcylindrical, the male with the three terminal segments usually modified.

Legs long and slender; *tibiæ* cylindrical; *tarsi* with the first joint very long; *ungues* usually serrated internally †

* In describing *C. tripunctata* (Journ. Linn. Soc. ix. 250), I placed it in the section "labrum antice rotundatum." The true definition of this part in the type was difficult, owing to the position the palpi had assumed. Further examination induces me to believe that the labrum is in reality slightly emarginate, as from analogy it should be.

† The genus *Bittacus* (which does not occur in the British Isles) has only one claw.

Wings linear, obtuse, nearly equal (*Boreus* is subapterous), no anal space; hyaline; the *costa* and *subcosta* are sub-parallel, and both join the costa before the apex; *pterostigma* indistinct. In repose the wings are carried longitudinally, and nearly horizontally.

Larva subterraneous.

The two British genera form two families, and the generic characters apply to the families in so far as our insects are concerned.

Family I. PANORPIDÆ.

Genus I. Panorpa, Linné.

Rostrum long; *ocelli* present; *clypeus* elongated, acuminate at the apex, projecting to the extremity of the labrum; *mandibles* narrow, unidentate; *maxillæ* with two ciliated lobes; *maxillary palpi* with the joints nearly equal, the terminal one more slender; labium elongate; *labial palpi* 4-jointed (according to Westwood), the three first joints broad, the terminal one more slender.

Abdomen sub-cylindrical, long; the second segment is sometimes produced above posteriorly; the fifth segment is elongated, and somewhat acuminate. In the male the three terminal segments are corneous and modified; the two first being more or less conical; the terminal (or eighth) is dilated, and carries a pair of forceps. The composition of this segment is very complicated; the basal portion, which is probably the true segment, is small, and carries two large dilated pieces, at the extremity of which is placed the forceps, the branches of which are irregularly toothed within; the upperside (or the surface which is opposite the dorsum of the abdomen when the terminal segment is recurved) is occupied by an elongate oval plate placed between the two lateral pieces; the lower side (that which is seen uppermost) carries two long appendices arising from the base of the segment, and within these are spine-like processes which are probably the penis-sheaths, the penis being small and concealed. In the female the three last segments are slender and not recurved, the terminal one carrying two diverging articulated appendices.*

* Although I have here followed other authors in giving *eight* abdominal segments, it appears probable that there are in reality *nine*; the first being confused with the hinder part of the meta-thorax. If this supposition be correct, the three modified male terminal segments should be called the seventh, eighth, and ninth, instead of the sixth, seventh, and

Legs long and slightly spinose; *ungues* broad and strongly serrated within; *pulvilli* large and spongy.

Wings long and narrow, the posterior slightly shorter and broader than the anterior; *transverse veinlets* rather numerous towards the apex, forming elongate cellules; the sub-costa joins the costa beyond the middle* in the anterior wings, and far before the middle in the posterior; the radius soon furcates, and forms an elongated discoidal cell; the basal portion of the wing has but few transverse veinlets (Pl. XI. fig. 7).

Though so common, the earlier stages of these insects were long a mystery. Stein first threw light on the subject by the discovery of the pupa, which he described and figured in Wiegmann's Archives for 1838, and their life-history has since been published by that pains-taking Neuropterist, Herr Brauer, who has given the result of his observations in the Sitz. Akad. Wissensch. of Vienna for 1851, and in the Verh. zool.-bot. Gesell. of Vienna for 1863. With the idea that a detailed account of Herr Brauer's discovery may be interesting to British Entomologists, I here give a translation of his latter paper, so far as the larva is concerned.

"The imagines may be kept alive with meat for about a month; those that die are at once devoured by the survivors. Several days after pairing, the female lays her eggs (never many, twelve at the utmost) in crevices of damp earth, and surrounds them with a viscid fluid. They are at first white, afterwards yellowish-gray, and their chorion is marked with net-like ridges."

"The larvæ emerge from the egg in eight days. They are then $\frac{2}{3}'''$ long, and $\frac{1}{3}'''$ broad. Immediately after emerging, they are white with black eyes, but soon become gray. On the whole they are then similar to full-grown larvæ, but are distinguished by the much thicker antennæ, and by the first to seventh abdominal segments having two warts above, each bearing one jointed bristle, which are also seen on the eighth to the tenth segments, but are there larger, and there are two on the eighth and ninth segments; these latter remain in all stages of growth, whereas the former are thrown off at the first moult."

eighth. The detached abdomen of a fresh example of *P. germanica* appeared to show clearly a rudimentary basal segment; see Plate XI. fig. 7 *a*, indicated at *a*.

* This refers only to British species; in the Continental *P. variabilis*, and in many exotic species, the sub-costa scarcely extends beyond the middle of the costa.

"Among generic characters the dentation of the mandibles stands pre-eminent. It remains constant throughout every moult. I therefore describe it together with the full-grown larva. The head is dark brown; the soft fore-part of the upper lip and the front border of the accessory part are white. The upper mandibles are strong, horny, triangular, their tips somewhat curved inwards; on the inner edge is a short blunt tooth, followed by a still shorter one, beyond which the mandibles increase considerably in breadth; the inner edge below these teeth is slightly concave. The lower mandibles have a broad basis, connected by a membrane with the under lip; the stalk and the hooks may be described as composing an angle; the hook is somewhat horny, and bears a round membranous masticatory piece, which in front and on the inner edge has very short points and is rough; on the outer side of these parts are the maxillary palpi, which are four-jointed, the first three joints almost equal, cylindrical, gradually diminishing in thickness, the last joint conical; the labial palpi are placed close together, short and thick, with two cylindrical basal joints, and one conical end-joint, which is as long as the other two united. The antennæ distinctly protrude; the first two joints are short, thick, and cylindrical; the third is thin, and twice as long, cylindrical at the base, thickened towards the end, and therefore somewhat clavate; the fourth is narrow, slightly spindle-shaped or cylindrical, provided at the end with three short points in very young larvæ."

"The large eyes lie behind and a little beneath the antennæ, exactly on the sides of the head; they are slightly contracted, and thus give the larvæ a strange appearance. On the clypeus and frontal and posterior plates of the head stand solitary bristle-like hairs. The head is not closely connected with the first thoracic segment, as the intervening membrane is considerably wide; beneath the latter there runs a fine, slightly curved, horny ridge. The pronotum is horny, broader than long, quadrangular; on its hinder edge, on each side, is the first spiracle. The other thoracic segments are membranous above, and bear only isolated small horny plates, a larger one in the middle, and two smaller ones on each side, on which stand solitary short bristle-like hairs; these plates vary somewhat in different species."

"The legs are short; the coxæ thick and cone-shaped; the femora cylindrical, with a narrow but distinct horny ring at the base; the tarsi are cylindrical, and between them and the tibiæ is, posteriorly, a small peg-like appendage surrounding the hinder part of the tarsus at its base; one might look upon this as a trochanter, but then it would be necessary to consider the coxæ as continuations of the thorax (as, indeed, such are found in the larvæ of *Phryganidæ*), and then the coxæ would be what have been termed thighs, but in that case we miss the separation of the tarsus and foot; the foot is very short, conical, ending in a small simple hook, only well seen on the hinder pair. The thoracic segments, however, leaving the legs out of the question, are of equal thickness with the seven following abdominal segments, and the meso- and meta-thorax agree in structure with them, only they do not bear any spiracles. The first to the seventh abdominal segments bear, each in the middle above, a broad triangular spot rolled up behind, within which the skin looks harder and horny; the rolled up portion bears on each side two bristles; on each side of this spot is a smaller horny plate, the hinder end of which becomes gradually more warty, and bears one bristle; posteriorly the middle plates gradually disappear; in place of the harder plate-like skin, there stand small wart-like protuberances, and on those, as previously mentioned, are placed the four bristles; the skin is of a darker colour round the spots. On closer examination, one observes that each end of the middle plate, standing above in the middle, consists of four smaller parts, divided by a cruciate membranous furrow. On the sides of the second and third thoracic segments are two dark horny wart-spots, one beneath the other, and on the sides of the first to the eighth abdominal segments are three such small plates in a triangle, the foremost of which bears the spiracle. On the underside of the said segments are nipple-like abdominal feet, increasing in size posteriorly. As peculiar distinctions, the eighth and ninth segments bear on the upper side two large cylindrical warts with a long-jointed bristle, and the tenth a median upper one. Out of the tenth segment a four-jointed holding-fork can be protruded, the spikes of which are blunt and cylindrical, two standing out sideways, and two straight behind. Internally numerous muscles approach this fork, the border of which is trans-

parent; it causes an exudation of an adhesive moisture, by means of which the larva is enabled to adhere for a time to highly polished surfaces."

"The larvæ never attack directly the raw meat with which they are fed, but generally burrow at some distance from it, and then tunnel a horse-shoe-shaped passage, one end of which comes up directly beneath the meat. If the food is rapidly turned over, they retire backwards into their tunnel, and escape unseen through the other free end, where they can easily attain the surface, which in the untunnelled earth they would not succeed in doing so readily, as they can dig but slowly. They behave like the false caterpillars of some saw-flies; they often run backwards rapidly, or stand freely up by means of their anal fork, and clean their legs with the mandibles by lowering the head and passing the legs through them. If touched, they roll themselves up, and feign death."

"They are full-grown in thirty days, and then burrow deeper into the ground, excavate an oval cell in a small lump of earth, and remain as larvæ for several months before assuming the pupa state. In this condition they shrivel to one-half of their previous length, the underside increases in thickness, and the end of the body is somewhat curved against the back. If taken out they move slowly, and have no power to walk. The bristles on the three last segments are then partly broken off."

The fact that Brauer reared his larvæ upon meat proves that ordinarily they are carnivorous, subsisting probably upon worms and underground larvæ.

Of these insects, so well known as "Scorpion Flies," we appear to have three species in Britain. The true specific differentiation can only be arrived at from an examination of the terminal segments of the male. The amount of black markings on the wings is only of slight importance, inasmuch as the variations in this respect are endless, and, as this character was the one mainly attended to by many authors, it happens, that by one, many so-called species were divided, and by another, all these were equally erroneously reduced to varieties of one. The number of teeth in the claws, a character to which Rambur would seem to have attached considerable importance, is unstable, and one or more teeth are frequently concealed by the large pulvilli.

The perfect insects are active and predaceous, living on other insects, which they pierce with their long rostrum; with this instrument they will also inflict a sharp and momentarily painful wound on the fingers, when incautiously handled.

Our three species can be tabulated thus:—

A. Terminal margin of the fifth segment in the male straightly truncated; sixth (antepenultimate) segment conical (Pl. XI. figs. 6, 7*a*).
  a. Appendices of the male linear (Pl. XI. fig. 6*a*). . . . . *P. communis*.
  a. a. Appendices flattened, dilated and truncated at the apex (Pl. XI. fig. 7*b*). *P. germanica*.

A A. Terminal margin of the fifth segment excavated, sixth segment sub-cylindrical, not conical; appendices linear (Pl. XI. fig. 8, 8*a*). *P. cognata*.

I have restricted the references and synonymy to those authors whose descriptions or types permit of a tolerably certain opinion being formed as to the species intended. Both Westwood and Klug, who have monographed the genus, wrongly unite all the European forms under one head; hence, I have omitted all reference to their works. Stephens' collection of these insects has been re-arranged since it became national property, and his *borealis* is no longer recognizable with surety, as no specimen is so labelled by him.

1. Panorpa communis, Linné.

Panorpa communis, Linn. Faun. Suec. 384 (1761), Syst. Nat. i. 915; Leach, Zool. Miscell. ii. 98, pl. xciv. fig. 2; Steph. Ill. vi. 52; Curt. Brit. Ent. pl. dcxcvi. text 1; Ramb. Névrop. 328; Brauer, Neurop. Aust. 36, fig. 17; Hag. Ent. Ann. 1858, p. 32; Eaton, Ann. & Mag. Nat. Hist. 1867, p. 396.

Head: vertex black, marked with dark castaneous beneath the eyes; back of head yellowish; *front* and *rostrum* castaneous, with two longitudinal blackish stripes; *antennæ* black, the basal joint reddish castaneous.

Prothorax black, margined with yellow. *Meso-* and *meta-thorax* black, yellowish in the middle. The whole of the breast yellowish.

Abdomen with the first five segments black, the lateral basal sutures yellowish. In the ♂, the second segment is scarcely produced in front above; the fifth is long, cylindrical, narrowed at the apex, truncate; the sixth cone-shaped, shorter than the fifth, very slender at the base, reddish castaneous, with a large black blotch above; the seventh similar in colour to the sixth, and very similarly formed, only that the apex above is somewhat obliquely truncated; the eighth (terminal) reddish testaceous, broad, the two branches of the forceps crossing each other in a very oblique direction; appendices very long, hairy, cylindrical throughout, approximating at the base and apex, but somewhat distant in the middle, the tips black (Pl. XI. figs. 6, 6*a*); in the ♀, the three terminal segments are reddish castaneous, short, the penultimate the shortest; appendices black.

Legs grayish yellow; *tibiæ* with a few black spines; *spurs* testaceous; *tarsi* blackish or fuscous; *ungues* with long and strong teeth internally.

Wings hyaline, with colourless membrane, and blackish fuscous markings; ordinarily with two spots near the base, forming an incomplete fascia, a complete irregular fascia beyond the middle, the apex broadly margined; detached dots between the fasciæ; these markings all vary much, and some of them are often absent; *pterostigma* indistinctly yellowish; *neuration* black, some of the transverse veinlets paler.

The largest British species. Length of body, ♂, 7 lines, ♀, 6 lines; expanse of wings 12-15 lines.

Abundant everywhere.

2. Panorpa germanica, Linné.

Panorpa germanica, Linn. Syst. Nat. i. 915 (1767); Curt. Brit. Ent. pl. dcxcvi; Ramb. Névrop. 329; Hag. Ent. Ann. 1858, p. 32; Eaton, Ann. & Mag. Nat. Hist. 1867, p. 397. *P. affinis,* Leach, Zool. Miscell. ii. 98, pl. xciv. fig. 2 (1815); Steph. Ill. vi. 52; Curt. Brit. Ent. pl. dcxcvi, text 2. *P. apicalis,* Steph. Ill. vi. 52 (1836); Hag. Ent. Ann. 1858, p. 33. *P. borealis,* Steph. Ill. vi. 53 (1836) ?. *P. montana,* Brauer, Neurop. Aust. 36 (1857).

Head: vertex castaneous, blackish in the middle; the back of the head yellow; *front* and *rostrum* testaceous, black below the basal joints of the antennæ, with two

indistinct fuscous longitudinal stripes; *antennæ* dark blackish fuscous, the basal joints conspicuously yellow.

Prothoraæ blackish, yellow behind and at the sides. *Meso-* and *meta-thoraæ* black at the sides, yellow in the middle. The breast yellowish.

Abdomen blackish, excepting the terminal segments; lateral sutures and the hinder margin of each segment yellow; in the ♂, the second segment is strongly produced in the middle above, overlapping the third; the fifth is scarcely longer than the sixth, ob-conic, truncated and margined with testaceous posteriorly; the sixth testaceous, marked with blackish above, cone-shaped, very slender at the base; the seventh slightly smaller than the sixth, more obliquely truncated in front above; the eighth (terminal) short, strongly dilated, the branches of the forceps shorter than in the last species; *appendices* short, flattened, dilated and truncated at the apex, usually blackish (Pl. XI. figs. 7*a*, 7*b*); in the ♀, the three terminal joints are strongly hairy, the two first broad and nearly equal, the last longer and narrower, with black appendices.

Legs grayish yellow; *tibiæ* with few blackish spines; *spurs* yellowish; *tarsi* fuscescent; *ungues* with fewer and shorter teeth than in the last species.

Wings sub-hyaline, with blackish markings, the membrane with a decided dark tinge; the spots scarcely forming fasciæ, the apex narrowly margined; *pterostigma* scarcely indicated; *neuration* black, with some paler transverse veinlets (Pl. XI. fig. 7).

Length of body, ♂, 4½-5 lines; ♀, 5 lines; expanse of wings 10-12 lines.

Very abundant everywhere. Varies greatly in the number of the spots; sometimes all are absent, excepting the apical margination; on these variations Stephens' species are founded.

Linné's type (♂) still exists in his collection, and bears a label "*germ.*" in his own handwriting.

It may be at once distinguished by the flattened and truncated appendices of the male.

3. Panorpa cognata, Rambur.

Panorpa cognata, Ramb. Névrop. 330 (1842); Eaton, Ann. & Mag. Nat. Hist. 1867, p. 397. *P. germanica*, Steph. Ill. vi. 53 (not of Linné); Brauer, Neurop. Aust. 36, fig. 18. *P. alpina*, Ramb. Névrop. 330 (1842)?; Hag. Ent. Ann. 1858, p. 32.

Head: vertex castaneous, blackish in front; back of the head yellow; *front* and *rostrum* reddish, with scarcely darker lines; *antennæ* blackish, the basal joint reddish.

Prothorax blackish, yellowish at the sides. *Meso-* and *meta-thorax* blackish at the sides, yellow in the middle. Breast grayish yellow.

Abdomen blackish, the lateral sutures and the hinder margins of the segments yellow; in the ♀ the fifth segment (as well as the three terminal ones) is reddish; in the ♂ the second segment is not visibly produced in the middle above; the fifth a little longer than the fourth, scarcely narrowed posteriorly, the sides of the posterior margins deeply excavated; the sixth cylindrical, not narrowed at the base, above somewhat fuscescent in the middle, and with the upper posterior margin elevated; the seventh cone-shaped, scarcely shorter than the sixth; the eighth (terminal) strongly dilated, the branches of the forceps short; *appendices* long and slender, not dilated, reaching to the base of the forceps, straight, diverging (Pl. XI. figs. 8, 8*a*); in the ♀, the terminal segments are gradually narrower.

Legs grayish yellow, or reddish; *tibiæ* with few blackish spines; *spurs* testaceous; *tarsi* fuscescent; *ungues* with few teeth.

Wings with few grayish or blackish markings, and with the membrane slightly tinted; the markings are, as a rule, reduced to a broad apical margination and one or two spots beyond the middle, whereof that at the pterostigma is conspicuous; *neuration* fuscescent, with a few pale transverse veinlets.

Size of *P. germanica*, and much resembling pale forms of that species. May always be separated by the form of the terminal abdominal segments and appendices of the male.

Local; appears to be most frequent in the New Forest.

Hagen (Ent. Ann. 1858) gives *P. apicalis* of Stephens as distinct; the types are not separable from his *P. germanica*.

It is scarcely probable that we have more species of *Panorpa* in Britain; though *P. variabilis* may occur on some of the higher mountains, and *P. meridionalis* should be looked for in the south-west of Ireland.

Family II. BOREIDÆ.

Genus I. Boreus, Latreille.

Rostrum long; *eyes* large, oval; *ocelli* absent; *mandibles* with several teeth at the apex internally; *maxillæ* connate with the mentum at the base; *maxillary palpi* with the joints slender, nearly equal; *labial palpi* very short, 2-jointed, the second minute.

Abdomen short and stout. In the ♂ the apex is curved upwards; the terminal dorsal segment is modified into two large cylindrical tubes, from each of which springs a slender appendix, which is directed backwards upon the dorsum; the last ventral segment takes the form of a large, elongate, oval or triangular plate; the penultimate segment is very narrow, especially on the dorsum. In the ♀ the apex is furnished with two elongated slender ventral valvules, in which, and extending beyond which, is a long tri-articulate borer.

Legs slender, cylindrical; first joint of the tarsi very long; *ungues* two, slender, simple; *pulvilli* small.

Wings rudimentary. In the ♂ four, slender, bristle-like, curved, serrated internally. In the ♀ in the form of a small scale-like lobe on each side of the meso-thorax.

Larva living in the earth or amongst moss.

The following account of the habits of the larva, etc., is abstracted from Brauer's paper, Verh. d. zool.-bot. Ver. in Wien, 1855, pp. 711-712. When paired the female is seated on the back of the male. The females died at the end of March and beginning of April, and on the 11th May he found larvæ in the breeding-glass, half a line in length, which he had little doubt were those of *Boreus*. In a later paper in the same journal, 1862, pp. 320-323, is a more detailed account from certain observation. The larva is short, thick, and curved; the head horny, pale-brown, broadest behind; the antennæ short; the mandibles toothed internally; the thoracic segments form the thickest part of the body; the divisions little evident. The legs, six in number, short, three-jointed, the first joint thick and conical, the second cylindrical and more slender, the third (or foot) rod-shaped, somewhat curved. The abdomen cylindrical, much thinner than the thorax, and with warts on the sides and above; the last segment rounded, without hooks. It fed upon moss, and its food imparted a

greenish colour to the white body, in consequence of the latter's transparency. The metamorphosis into the pupa state began in September, but many larvæ were already full-grown in February. The pupa is placed in a small cylindrical tunnel in the earth, which is lined with fine web. It is similar to the imago, but shorter and thicker; the colour at first yellow, afterwards pale greenish-yellow; the vertex, eyes, and pro-notum black; the antennæ and legs lie at the sides of the body, and the rudimentary wings are already seen, as are also the sexual characters. It comes to the surface to change to the imago state.

1. Boreus hyemalis, Linné.

Panorpa hyemalis, Linn. Syst. Nat. i. 914 (1767); Fab. Syst. Ent. 314. *Boreus hiemalis*, Latreille, and other authors. *Gryllus proboscideus*, Panz. Faun. Germ. part xxvii. p. 18 (1796).

Varying from greenish-yellow in very immature examples to bronzy-green or bronzy-brown in very mature ones; the basal half of the antennæ, the rostrum (except at its apex), the whole of the pectus, the legs (save at the articulations), the wings of the ♂, and the oviduct of the ♀ (excepting the tip), more or less yellowish or yellowish-brown. In the ♂ the posterior edge of the first (second?) dorsal abdominal segment bears an erect truncated lobe, the lateral edges of which are directed obliquely inwards, so that the truncated apex is the broadest part; the succeeding segment bears a sort of tubercle on its hinder edge, smaller and less conspicuous than the above-mentioned lobe; the ventral valve is triangular, the apex produced, and scarcely acute, entire.

Length of body, ♂ $1\frac{3}{4}$-2 lines; ♀ (with oviduct) $2\frac{1}{2}$ lines.

This truly winter insect is found in moss from October till March, and has been observed on the surface of the snow. It is apparently most frequent in the North of England, though occasionally found near London, Mr. Walker having taken it at Southgate, and Messrs. Douglas and Scott near Croydon. These latter gentlemen noticed its peculiar saltatorial habits, which are also indicated by Zetterstedt, and appear to obtain in

both sexes; though it is difficult to imagine by what structural characters the insect is enabled to effect the jumps. The male seems to be much more rare than the female.

Hagen (Ent. Mo. Mag. iii. 132) indicates the British insect as distinct from that of Linné, under the name of *B. Westwoodii*, giving as differentiating characters the pale colour of the legs, rostrum, etc., and the slightly grooved apex of the ventral valve in the ♂. I have been unable to identify *B. Westwoodii*, never having seen a ♂, either British or continental, presenting the above-noted structural character in the ventral valve; and so, for the present, I feel compelled to consider our species as that of Linné, not having been able to examine more than three or four males. At the same time, I remark that Dr. Hagen's well-known powers of discrimination render it very probable that two European species really exist.

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Synonymic Catalogue of British Planipennia.

Div. I. SIALINA.

Fam. I. SIALIDÆ.

Gen. i. Sialis, Lat.

Sp. 1. *S. lutaria*, Linn.
flavilatera, Linn.?.
niger, Lat.

Sp. 2. *S. fuliginosa*, Pict.

Fam. II. RAPHIDIIDÆ.

Gen. i. Raphidia, Linn.

Sp. 1. *R. notata*, Fab.
ophiopsis, Curt.
megacephala, Steph.
media, Burm.
angustata, Ratz.

Sp. 2. *R. xanthostigma*, Schum.
Londinensis, Steph.

Sp. 3. *R. cognata*, Ramb.

Sp. 4. *R. maculicollis*, Steph.
affinis, Steph.
hispanica, Ramb.

Div. II. HEMEROBIINA.

Fam. I. HEMEROBIIDÆ.

Gen. i. Osmylus, Lat.

Sp. 1. *O. fulvicephalus*, Scop.
maculatus, Fab.
chrysops, Auct. (*nec* Linn.)
laurifoliæformis, Raz.

Gen. ii. Sisyra, Burm.

Sp. 1. *S. fuscata*, Fab.
confinis, Steph.
nitidulus, Steph.
nigripennis, Wesm.
fumatus, Mots.

Sp. 2. *S. Dalii*, M'Lach.
nitidulus, Walk.

Sp. 3. *S. terminalis*, Curt.

Gen. iii. Psectra, Hag.

Sp. 1. *P. diptera*, Burm.

Gen. iv. Micromus, Ramb.

Sp. 1. *M. variegatus*, Fab.

Synonymic Catalogue of British Planipennia—*continued.*

Sp. 2. *M. aphidivorus*, Schrk.
angulatus, Steph.
villosus, Zett.
intricatus, Wesm.
tendinosus, Ramb.
lineatus, Gözsy.

Sp. 3. *M. paganus*, Linn.
nemoralis, Steph.
lineosus, Ramb.
elegans, Gözsy.

Gen. v. Hemerobius, Linn.
Mucropalpus, Ramb.

Sp. 1. *H. elegans*, Steph.
Marshami, Steph.
paucinervis, Zett.
pygmæus, Ramb.

Sp. 2. *H. pellucidus*, Walk.
fuscescens, Walleng.

Sp. 3. *H. inconspicuus*, M'Lach.

Sp. 4. *H. nitidulus*, Fab.
ochraceus, Wesm.
obscurus, Ramb.

Sp. 5. *H. micans*, Oliv.
punctatus, Steph.
pallidus, Steph.
lutescens, Burm.
irroratus, Costa.
fuscinervis, Schn., var.

Sp. 6. *H. humuli*, Linn.
lutescens, Steph.
affinis, Steph.
paganus, Steph.
apicalis, Steph.
maculatus, Wesm.

Sp. 7. *H. marginatus*, Steph.
flexuosus, Hag.

Sp. 8. *H. limbatus*, Wesm.
subfasciatus, Steph.
irroratus, Steph.
stigma, Steph.
limbatellus, Zett. ?.

Sp. 9. *H. pini*, Steph.
punctatus, Gözsy ?.

Sp. 10. *H. atrifrons*, M'Lach.

Sp. 11. *H. subnebulosus*, Steph.
fuscus, Steph.
nebulosus, Ste. (part).
obscurus, Steph.
nervosus, Steph.
perelegans, Steph.

Sp. 12. *H. nervosus*, Fab.
nebulosus, Ste. (part).
conspersus, Burm.
distinctus, Ramb.

Sp. 13. *H. concinnus*, Steph.
hirtus, Burm.
cylindripes, Wesm.
atomarius, Gözsy.

Gen. vi. Megalomus, Ramb.

Sp. 1. *M. hirtus*, Linn.
fimbriatus, Curt.
tortricoides, Ramb.

Gen. vii. Drepanepteryx, Leach.

Sp. 1. *D. phalænoides*, Linn.

Fam. II. CONIOPTERYGIDÆ.

Gen. i. Coniopteryx, Hal.
Coniortes, Westw.
Malacomyza, Wesm.
Sciodus, Zett.
Aleuronia, Fitch ?.

Sp. 1. *C. psociformis*, Curt.
aphidiformis, Ramb. ?

Sp. 2. *C. tineiformis*, Curt.
lactea, Wesm.

Sp. 3. *C. aleyrodiformis*, Steph.

Fam. III. CHRYSOPIDÆ.

Gen. i. Chrysopa, Leach.

Sp. 1. *C. flava*, Scop.
subfalcata, Steph.
vittata, Schn.

Sp. 2. *C. vittata*, Wesm.
albus, Fab.
perla, Steph.
proximus, Ramb.
integra, Hag.

Sp. 3. *C. alba*, Linn.
ciliata, Wesm.

Sp. 4. *C. flavifrons*, Brauer.

Sp. 5. *C. vulgaris*, Schn.
perla, Fab.
affinis, Evans.
carnea, Ste. (for. bru.)
primaveria, Brauer.
incarnata, Brauer.
rubropunctata, Brau.

Synonymic Catalogue of British Planipennia—*continued*.

Sp. 6. *C. 7-punctata*, Wesm.
angustipennis, Steph.
mauricianus, Ramb.
pallens, Ramb.
nobilis, Brauer.

Sp. 7. *C. aspersa*, Wesm.
prasina, Ramb.
Ramburii, Costa.

Sp. 8. *C. ventralis*, Curt.

Sp. 9. *C. abbreviata*, Curt.
immaculata, Steph.
chlorophanus, Ratz.

Sp. 10. *C. phyllochroma*, Wesm.
abbreviata, Steph.
pusilla, Brauer.
tenella, Brauer.

Sp. 11. *C. perla*, Linn.
chrysops, Fab.
cancellata, Schrk.
maculata, Steph.
reticulata, Steph.

Gen. ii. Nothochrysa, M'Lach.

Sp. 1. *N. fulviceps*, Steph.
erythrocephalus, Ram.

Sp. 2. *N. capitata*, Fab.

Div. III. PANORPINA.

Fam. I. PANORPIDÆ.

Gen. i. Panorpa, Linn.

Sp. 1. *P. communis*, Linn.

Sp. 2. *P. germanica*, Linn.
affinis, Leach.
apicalis, Steph.
borealis, Steph. ?.
montana, Brauer.

Sp. 3. *P. cognata*, Ramb.
germanica, Steph.
alpina, Ramb. ?.

Fam. II. BOREIDÆ.

Gen. i. Boreus, Lat.

Sp. 1. *B. hyemalis*, Linn.
proboscideus, Panz.

Explanation of the Plates.

PLATE VIII.

Fig. 1.—*Sialis lutaria*, neuration of anterior wing; 1 *a*, extremity of abdomen of ♂, from above; 1 *b*, ditto, from side; 1 *c*, ventral valve; 1 *d*, maxilla and palpus; 1 *e*, labium and palpus; 1 *f*, mandible; 1 *g*, labrum of ♂; 1 *h*, ditto of ♀; 1 *i*, tarsus.

2.—*Sialis fuliginosa*, neuration of anterior wing; 2 *a*, extremity of abdomen of ♂, from above; 2 *b*, ditto, from side; 2 *c*, ventral valve.

3.—*Raphidia notata*, neuration of anterior wing; 3 *a*, extremity of abdomen of ♂, from side; 3 *b*, ditto, from beneath; 3 *c*, ditto of ♀, from above; 3 *d*, ditto, from side; 3 *e*, maxilla and palpus.

4.—*Raphidia xanthostigma*, neuration of anterior wing; 4 *a*, extremity of abdomen, from above; 4 *b*, ditto, from beneath; 4 *c*, ditto, from side, after death.

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PLATE IX.

Fig. 1.—*Raphidia cognata*, neuration of anterior wing.

2.—*R. maculicollis*, ,, ,,

3.—*Sisyra terminalis*, neuration of anterior and posterior wings.

4.—*Micromus variegatus*, ,, ,, ,,
4 *a*, extremity of abdomen of *M. paganus*, from side; 4 *b*, ditto, from beneath.

5.—*Psectra diptera*.

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PLATE X.

Fig. 1.—*Hemerobius pellucidus*, neuration of anterior wing.

2.—*H. inconspicuus*, appendices of ♂, from side.

3.—*H. nitidulus*, ,, ,,

4.—*H. micans*, ,, ,,

5.—*H. humuli*, neuration of wings; 5 *a*, appendices of ♂, from side.

PLATE X—*continued.*

Fig. 6.—*Hemerobius marginatus;* appendices of ♂, from above; 6 *a*, ditto, from side.

7.—*H. limbatus*, appendices of ♂, from side.

8.—*H. subnebulosus*, ,, ,,

9.—*H. nervosus*, ,, ,,

10.—*H. concinnus*, neuration of portion of anterior wing; 10 *a*, appendices of ♂, from side; 10 *b*, ditto, from beneath; 10 *c*, extremity of abdomen of ♀, from side.

11.—*Megalomus hirtus*, neuration of wings.

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PLATE XI.

Fig. 1.—*Coniopteryx psociformis*, neuration of wings.

2.—*C. tineiformis*, ,, ,,

3.—*Chrysopa vulgaris*, neuration of anterior wing.

4.—*C. alba*, ,, ,, (portion); 4 *a*, simple claw of *Chrysopa* (*C. phyllochroma*); 4 *b*, dilated claw (*C. abbreviata*).

5.—*Nothochrysa capitata*, neuration of anterior wing.

6.—*Panorpa communis*, extremity of abdomen of ♂, from side; 6 *a*, appendices of ditto.

7.—*P. germanica*, neuration of wings; 7 *a*, outline of abdomen of ♂, from side; 7 *b*, cheliform terminal segment, and appendices.

8.—*P. cognata*, extremity of abdomen of ♂, from side; 8 *a*, appendices of ditto.

X. *Observations on the Duration of Life in the Honey Bee.* By J. G. Desborough.

[Read 4th May, 1868.]

The following observations on the Honey Bee are in continuation of the Prize Essay of the Entomological Society for the year 1852 (Trans. Ent. Soc., second series, vol. ii. p. 145); and of the Paper on the same subject read on the 2nd April, 1855 (*ib.*, vol. iii. p. 187).

In the last mentioned paper, I traced the existence of a queen bee from the month of July, 1852, to the end of the year 1854; and I now propose to give the result of my observations upon the queen, with which the hive was stocked, until her death, or rather, her disappearance.

The month of January, 1855, was frosty nearly throughout, with much snow, and the frost continued in the succeeding month up to the 25th, when a thaw set in; notwithstanding this severe weather, the queen commenced depositing eggs, and on the 19th February, I observed brood sealed over; on the 10th March, I saw a young bee perfect, and on that day there were 108 cells sealed over containing brood; the queen however did not again deposit eggs until April, one prevailing cause for which might possibly have been the continued cold season, but singularly enough, one drone cell was observed on the 1st April in the midst of worker cells, but the grub had died before being sealed over. The breeding from the 6th April, on which day the queen again deposited eggs, was carried on uninterruptedly until September. Pollen was first collected on the 6th April, and the spring was so unfavourable, that I was compelled to continue feeding throughout May and up to the 17th June, after which time honey was rapidly collected and stored.

Another single drone was reared in a worker cell, and although he was allowed to come to maturity, on the 11th July he was dragged out of the cell and killed.

The brood during this year, with the exception named above, was entirely worker brood, and although the queen, to all external appearance, was as healthy as ever, she did not produce in the aggregate one half the quantity of bees brought forth in the preceding year; this

might probably be owing to the severity of the season in the early spring and summer, but we shall have occasion further to allude to this subject towards the close of this paper.

The winter of 1855-1856 was again wet and cold, as well as frosty, and the great difficulty was to keep the bees free from damp, and as the combs were now getting dark and dirty, there was great tendency to mould; I managed, however, to get the hive through the winter with very little loss of life in the interior of the hive, compared with that of the preceding year. On the 30th January I saw brood sealed over, and a few drone cells also sealed over; but although the workers were allowed to hatch off at maturity, the drones were dragged out and destroyed, after being sealed over about three days. The breeding was not continued, nor was it resumed until April. In July, a small space, four inches by two, on each side of one comb, was occupied with drone brood, which was hatched off by the 11th August, and these drones were killed in the ordinary way about ten days afterwards.

The proceedings of the hive do not call for any special remark during this year.

We now come to the winter of 1856-1857, which commenced with a deep snow so early as Nov. 26th, and a frost lasting till December 5th, very severe; and on the breaking up of the frost, the hive was excessively damp, and apparently unhealthy, as I removed eighty dead bees; I contrived, however, to get the hive dry, and pursuing the same course of management as before, I brought them through the winter; brood was first detected on the 21st February, and only worker eggs were laid; the breeding was again delayed after the first batch until April, and continued until September; but during this year there was no appearance whatever of drone brood; still the queen looked healthy, and the hive continued in good condition; I had cut out as much of the old comb as was dirty, and had become mouldy; it had been renewed by the bees, and the hive was in as good a state to stand the winter as at any previous period. I had continued the daily observation of the queen up to the 22nd November, but after that day I could not detect her; I thought she might be concealed between the two centre combs, and I did not disturb the hive for a few days; but still not seeing her, on the 29th

I made a regular search, but the queen was not in the hive, and what had become of her I could not discover; the weather was fine and sunny, and whether she had been tempted to leave the hive and had become chilled, or whether she had been picked up by a bird, or what else was her end, it is not for me to record. I can only state the fact, that a queen bee will live for five years and upwards, namely, from July 1852 to November 1857; in fact, six summers or seasons. The actual duration of life in the queen bee still remains undetermined.

The period of five years and four months is, I believe, the longest recorded duration of life in the queen bee. Golding, in his "Shilling Bee Book" (1847), speaks of a queen bee with an imperfect wing existing in a hive from May 1828 to June 1832; but this recorded life exceeds his by a year and a quarter.

I annex a table of the number of bees produced in the hive during the summers of 1855, 1856, and 1857, making a total, with the numbers shown in the last paper, of 108,026 as the produce of one insect, and this of one kept in an artificial state. The numbers produced in a hive not so confined as the Observatory hive must be very great indeed, and the comparative numbers produced in each year bring us again to reconsider the duration of life in the queen bee.

Table showing the actual number of bees produced in the Observatory Hive during the years 1855, 1856, and 1857.

1855.		1856.		1857.	
Time of measuring Brood.	No.	Time of measuring Brood.	No.	Time of measuring Brood.	No.
February 19	108	January 30	40	February 28	216
April 16	162	April 13	108	April 12	81
May 6	270	May 4	729	May 3	756
,, 27	668	,, 25	1,350	,, 24	864
June 17	1,080	June 15	2,916	June 14	2,916
July 8	3,240	July 6	4,563	July 5	3,483
,, 29	4,077	,, 27	6,480	,, 26	3,402
August 19	4,347	August 17	216	August 16	2,214
September 8	351			September 6	1,296
	14,303		16,402		15,228

The Grand Total of the six seasons was as below :—

1852	7,060
1853	23,701
1854	31,332
1855	14,303
1856	16,402
1857	15,228
	108,026

Looking at the number of eggs laid by the queen in the six seasons of her life, we find that she was most fertile during the second and third years of her existence ; and although it is proved that the queen *can* live over five years, yet it does not follow that, in a state of nature, she may be permitted to reign as the monarch of the hive during that time ; had the queen observed upon been in an ordinary hive which had been allowed to swarm, she would have changed her residence every time a swarm issued, and she would then have acted as the leader thereof; but whether she would have succeeded in establishing herself at the head of five successive colonies is, I think, very doubtful.

Bee-keepers are well aware of the many times a swarm issues and returns, as is supposed, because they cannot find the queen; may it not happen that the queen is incapable, from old age, of flying with the swarm to their place of setting, and so is lost ?

As to the probable ordinary duration of life in the queen when in a state of nature, I am much inclined to place the limit at three or four years, and to assert that the age of my queen, prolonged to five years and four months, was beyond the ordinary duration. I have, however, been extremely careful throughout both my Essay and the Papers in continuation, not to state any facts but those I have personally observed ; and other apiarians as well as myself can draw their conclusions therefrom.

As to the age of the drone, I can add nothing to my last paper, because, with the exception of the few drones reared in the summer of 1856, none were brought forth.

With respect to the age of the worker, I kept a record of the number of bees dying in the hive in the years 1855, 1856, and 1857 ; they were,—

In	1855	1442
	1856	235
	1857	375

These numbers bear a remarkably small proportion to the number of bees produced, and if we suppose all the others to have been killed, in one way or another, outside the hive, it is a proof of the great dangers to which the worker-bee is exposed in pursuit of the ordinary work of life. The proceedings of the hive, since the publication of the last paper, were little more than a repetition of the former years, and I see no reason to doubt the conclusion therein drawn, that the duration of life in the worker-bee is eight months.

I stocked my Observatory hive on the 22nd June, 1867, with a portion of a swarm, and as the hive had a considerable quantity of comb therein, made in the previous year by a stock which had died, breeding was most rapidly carried on; and as the latter part of the season was very favourable for honey gathering, the hive was well stored with honey sealed over. The hive is still in the old situation, and as the winter of 1867-1868 continued favourable, and the hive showed no appearance of damp or mould, I resolved to let it alone, carefully watching it, to adopt any course which might be found needful under the circumstances. However, I have never once interfered with the hive, and it has passed through the winter without any assistance from me. A few dead bees were occasionally seen at the bottom of the hive, but they were always removed by the bees themselves on the first sunny day.

During the five winters, from 1852 to 1857, the seasons were all so different to the one just past, that, in the one case, the bees could not possibly have lived through December without artificial means being resorted to for their preservation; in the other, they have survived, and have been at all corresponding periods of the year more healthy, and the hive in a much better state. It is impossible, therefore, to lay down any rule for the management of bees in an Observatory hive through the winter; all must depend upon the season, for whilst one course of management may be the means of preserving them during a cold, wet, and severe winter, the same course in a mild and genial winter would be much too exciting, and would lead to their destruction rather than their preservation.

The Observatory hive has been this year more in a natural state than during any former winter through which it has been kept alive, and the queen began to lay her eggs, from which brood has been reared, in the month of February, but no cessation of breeding has this year taken place, so that it would seem that the ceasing to breed at this period of the year was the result of the inclement weather, and was not a natural course of events in the life of the queen.

XI. *Descriptions of* Aculeate Hymenoptera *from Australia.*

By Frederick Smith, late Pres. Ent. Soc.

[Read 4th May, 1868.]

Of the fifty-five species of Aculeate *Hymenoptera* described in this paper, not less than thirty have been received from Mr. H. Du Boulay, who discovered them at and in the neighbourhood of Champion Bay, in Western Australia. Amongst them, are three species of the genus *Crabro*, not one I believe having been described previously from that country. Of the rare genus *Paragia*, four new species are added, and several fine additions are made to the *Thynnidæ*.

The principal discoveries of *Apidæ* are a fine metallic coloured species of the genus *Stenotritus*; one species of *Lithurgus*, and six of *Megachile*. The last-mentioned genus is well represented in Australia, since at least thirty species are known; in all other countries where these leaf-cutting bees are found, so also is their parasite *Cœlioxys*; but not a single species of that genus has, to my knowledge, been found in Australia. Probably some other genus of bees is the parasite of *Megachile* in that country, though I am not acquainted with any parasitic bee at all likely to be so; if *Cœlioxys* is an Australian insect, it is certainly remarkable that no one should have hitherto captured it.

The species not indicated as being in the National Collection are in my own cabinet.

Fam. THYNNIDÆ.

Gen. Thynnus.

1. *Thynnus ochrocephalus.*

Male. Length 11 lines. The head, prothorax, and anterior legs, bright ochraceous, body and legs black. The antennæ, tips of the mandibles, and a transverse band on the vertex, enclosing the stemmata, black. Thorax punctured, the metathorax and legs with a fine short cinereous pubescence; the anterior tarsi black; wings sub-hyaline and ferruginous, their base brown, with the extreme base black, their apical margins with a broad

fuscous border extending to the base of the marginal cell. Abdomen finely punctured, and having, in certain lights, tints of blue; thinly covered above with cinereous downy pile.

Hab. Champion Bay.

In the British Museum.

I have only seen two specimens of this fine addition to the genus, one of which is in my own possession, presented to me by Mr. H. Du Boulay.

2. *Thynnus campanularis.*

Male. Length 1 inch. Black: spotted and banded with pale yellow markings. Head: the clypeus, a V-shaped mark between the antennæ, the mandibles and orbits of the eyes interrupted at their summit, yellow; the cheeks with long thin cinereous pubescence, a similar short thin pubescence on the vertex. Thorax: an interrupted line on the collar, two spots beneath the wings, the coxæ beneath, the metathorax with a reversed bell-shaped spot in the middle extending its entire length, the post-scutellum, two minute spots on the scutellum and a spot on the tegulæ, yellow; wings hyaline, nervures black. Abdomen: elongate, each segment with an interrupted fascia in the middle, the fasciæ narrow, and slightly curved upwards at the lateral margins; beneath, the segments have an ovate spot on each side, those on the second segment large and united, almost occupying the entire segment; the first segment with a central triangular spot.

Hab. Sydney.

3. *Thynnus oblongus.*

Male. Length 10½ lines. Black. Head: the clypeus and mandibles yellow, the latter bidentate, and black at their apex; a narrow red obscure line behind the eyes. Thorax: rugose; the disk with a short brown pubescence; beneath, the sides and the metathorax with a cinereous pubescence; tibiæ and tarsi ferruginous, the apical joints of the latter black; wings fulvo-hyaline, the nervures fuscous. Abdomen elongate, finely punctured, the basal margins of the segments smooth and shining,

the other portion with a thin covering of cinereous pubescence, which is more dense and glittering at the sides; beneath punctured, and with a thin short cinereous pubescence.

Hab. Melbourne.

4. *Thynnus conspicuus.*

Male. Length 8-9 lines. Black: with red and yellow markings. Head: rugose; the clypeus, a spot at the base of the mandibles, the margin of the elevation beneath which the antennæ are inserted, and a narrow yellow line behind the eyes at the lower part of their orbits, yellow. Thorax: rugose, and with a thin hoary pubescence; the prothorax above, and a quadrate spot on the mesothorax, ferruginous; a black macula on each side of the prothorax, and a minute spot on the margin in front; a spot on the scutellum, the post-scutellum, and two ovate spots on the metathorax, yellow; the tips of the joints of the legs and of the tarsi, ferruginous; wings hyaline, with a slight yellow tinge. Abdomen smooth and shining; the first segment with a minute spot on each side, and the four following segments, with an interrupted yellow fascia in the middle, each narrower than the preceding; beneath, the second, third, and fourth segments have an interrupted white fascia.

Hab. South Australia.

In the British Museum.

5. *Thynnus impetuosus.*

Male. Length 1 inch. Black: the abdomen with silvery-white fasciæ. Head as wide as the thorax, and shining; the anterior margin of the clypeus, the mandibles, and a ∨-shaped mark above the insertion of the antennæ, yellow; the upper portion of the clypeus and tips of the mandibles ferruginous; the face and cheeks with silvery-white pubescence. Thorax: above, slightly shining, the scutellum roughly punctured, the metathorax clothed with long white pubescence, and transversely rugose; wings fusco-hyaline, with a darker fuscous stain traversing the nervures, which are black; the thorax with

a shortish hoary pubescence. Abdomen shining; the apical margins of the segments with a narrow fringe of silvery pubescence, the abdomen not truncate at the base, but, as well as at the apex, pointed.

Hab. South Australia (Hunter River ?).

In the British Museum.

6. *Thynnus audax.*

Male. Length 1 inch. Head and thorax black, abdomen ferruginous, the insect adorned with yellow markings. Head and thorax with a golden yellow pubescence; the clypeus, cheeks, mandibles, and orbits of the eyes, yellow. Thorax: the prothorax, scutellum, post-scutellum, metathorax, the tegulæ, and two oblique lines on the mesothorax, yellow; the legs ferruginous; wings fulvo-hyaline, nervures ferruginous towards the apex of the wings, but becoming fuscous towards their base. Abdomen: ferruginous, with an ill-defined ovate spot on each side of each segment, the spots pale ferruginous, irregularly bordered with a narrow yellow line; the basal segment has on each side a small black ovate spot, and also a short line near its apical margin; beneath, mottled with yellow.

Hab. Australia.

In the British Museum.

7. *Thynnus seductor.*

Male. Length 9½ lines. Head and thorax black, the abdomen yellow with black fascia. Head: the clypeus and mandibles bright yellow, the latter black at their tips; the antennæ as long as the thorax. The thorax roughly punctured; beneath, at the sides, and also the metathorax, thickly clothed with long cinereous pubescence; the anterior margin of the thorax raised, the margin slightly incurved; the wings fuscous, the nervures black. Abdomen: about the same length as the head and thorax; yellow, with the apical margins of the segments bordered with a narrow black band, each band runs into a small black notch in the middle, between which and the lateral margins, on each side, it is abruptly widened, and again abruptly narrowed, thus forming an oblong broader mar-

gin; two or three of the apical segments have a narrow black band on their basal margin also; the apical segment is longitudinally striated; beneath, the apical margins are fusco-ferruginous; the terminal segment with a broad lanceolate spine, which has at its base an acute angular process on each side; each band runs into a notch in the middle.

Hab. Champion Bay.

In the British Museum.

8. *Thynnus subinterruptus.*

Male. Length 8 lines. Head and thorax black, and variegated with yellow; abdomen elongate, black, with yellow fasciæ. The clypeus, mandibles, orbits of the eyes, interrupted at their summit, and a forked spot between the antennæ, yellow; the clypeus with an oblique dark line on each side, very faintly indicated. Thorax: the anterior margin raised, a spot at its sides, a narrow interrupted line a little before its posterior margin, the tegulæ, the post-scutellum, and a spot on the scutellum, yellow; the apex of the posterior femora, a line beneath them, and a spot on the intermediate femora beneath, yellow; the apex of the tarsal joints ferruginous; the wings hyaline, the nervures black. Abdomen: the base, the apical segment, and the apical margins of all the segments, black; these marginal bands united by a central longitudinal interrupted ferruginous line, the marginal bands bordered by a narrow ferruginous stain; an oblong ferruginous spot on each segment towards its lateral margins; beneath, the abdomen has the margins of the segments stained with ferruginous, also a central ferruginous line which expands on each segment into an angular shape.

Hab. Champion Bay.

In the British Museum.

9. *Thynnus (Agriomyia) irritans.*

Male. Length 7½ lines. Orange-yellow: the flagellum, and a quadrate shape on the vertex, enclosing the ocelli, black. Thorax: the mesothorax black, with a quadrate yellow spot on the disk, and a large irregular shape beneath the wings, orange-yellow; the wings fuscous, the

nervures black, the marginal cell dark fuscous. Abdomen oblong, rounded at the base, which has a quadrate brown spot, the basal margins of the segments rufo-fuscous, the apical margins narrowly ferruginous; beneath, the margins are coloured faintly as above; the apical segment with a short black spine. The antennæ not reaching beyond the scutellum.

Hab. Champion Bay.

In the British Museum.

10. *Thynnus (Agriomyia) incensus.*

Male. Length 5½ lines. Black, with the two apical segments of the abdomen red. The anterior margin of the clypeus with a narrow yellow border; the head finely rugose. Thorax as rugose as the head, with the scutellum more coarsely so; the spines at the apex of the tibiæ white; the wings hyaline, the nervures black; the metathorax with thin cinereous pubescence. The abdomen shining; the apical margins of the first four segments have, in the centre, a pair of small quadrate white maculæ, the first pair almost united and tapering to a point laterally, and narrower than the two following pairs; the fourth pair narrow and tapering like the first pair; the style at the apex of the abdomen black.

Hab. Champion Bay.

11. *Thynnus (Agriomyia) baccatus.*

Male. Length 5 lines. Head and thorax black, the abdomen red. The clypeus, mandibles, and a minute spot at the insertion of each antenna, white. The anterior and posterior margins of the prothorax narrowly edged with white; tegulæ and post-scutellum white; the legs ferruginous, with the tarsi dusky; wings hyaline, the nervures black. Abdomen ferruginous, the base and the apical segment black; the apical half of the first segment is divided from the black base by a transverse slightly-interrupted white line; the four following segments have an oblique, ovate, white spot; the sixth segment is toothed on each side beneath, and the anal style is trispinose.

Hab. Champion Bay.

Gen. Ælurus.

Ælurus volatilis.

Male. Length 7¼ lines. Black, with the legs and abdomen red. Head: the anterior margin of the clypeus, the palpi, mandibles, and a curved line above the insertion of the antennæ, bordering an elevation, reddish-yellow: the cheeks with a minute tooth at the base of the mandibles; the scape ferruginous, dusky above; the cheeks with long cinereous pubescence, that on the mesothorax fulvous. Thorax: the sides, beneath, as well as the metathorax, with a thin cinereous pubescence, the prothorax above, the scutellum and legs, of a brick-red; the anterior margin of the prothorax and the post-scutellum, yellow; wings fulvo-hyaline, with prismatic reflections in certain lights. Abdomen red, black at the extreme base; the sixth segment is also black at its basal margin.

Hab. Adelaide.

In the British Museum.

Gen. Tachypterus.

Tachypterus albo-pictus.

Male. Length 7 lines. Black, variegated with white. Head: the inner orbits of the eyes, a spot on each side of the clypeus, the basal half of the mandibles, and a narrow line behind the eyes, white. Thorax; the posterior margin of the prothorax, a curved line from the insertion of the posterior wings traversing the posterior margin of the scutellum, the post-scutellum, the tubercles, the front of the anterior coxæ, and a spot outside the the posterior pair, white; the spines at the apex of the tibiæ, white; the sides obscurely blue, as well as the metathorax; wings fusco-hyaline, the nervures black. Abdomen: a minute spot on each side of the first segment, an interrupted line on the posterior margin of the second, third, and fourth, white; two minute white spots at the apex.

Hab. Australia.

Fam. SCOLIIDÆ.

Gen. Dimorphoptera, n. g.

The following are the characters of the females; (the males are not known with certainty, though I believe the specimen described as *D. nigripennis* to be a male). The maxillary palpi 6-jointed, the joints of about equal length and thickness, except the apical joint which is more slender; the labial palpi 4-jointed, the joints equal and short. Mandibles stout, curved, and not toothed. Antennæ filiform, short and stout; the scape stout, equal in length to the three basal joints of the flagellum united. Thorax oblong, prothorax transverse, the metathorax truncate; the superior wings with one marginal, and three sub-marginal cells; the marginal extending half-way towards the apex of the wing, from the apex of the cell usually a short abbreviated nervure; the first and second cells of about equal length; the second receiving a recurrent nervure in the middle, the third cell shorter, and receiving the second recurrent nervure towards the base, the apical nervure of the third submarginal is recurved, and much rounded towards the apex of the wing, and issues from the marginal cell towards, not from, its apex. Legs and abdomen as in the genus *Myzine*.

This genus may be considered merely a section of the genus *Myzine*, from which it only differs in the arrangement and neuration of the cells of the wings; in *Myzine*, the marginal cell receives the apical nervure of the third submarginal at its extreme apex, which is not the case in *Dimorphoptera*.

To this genus belong *Myzine signata*, *M. sabulosa*, *M. anthracina*, *M. fuscipennis*, and *M. unicolor*.

1. *Dimorphoptera scoliiformis*.

Female. Length 1 inch. Black: the head shining, the face rugose-punctate; above, sparingly and finely punctured; the mandibles falcate, smooth, shining, and fringed beneath with black hairs. The prothorax and scutellum strongly punctured, the mesothorax with finer scattered punctures, and with two longitudinal impressed lines; the metathorax opaque; the prothorax, scutellum, metathorax and also beneath, with erect black hairs; the

legs very pubescent, the intermediate and posterior tibiæ coarsely rugose outside and spinose, the tarsi very spinose; wings dark fuscous, with reflections of purple and violet. Abdomen: shining, sparingly and finely punctured; the margins beneath, and at the sides, fringed with black pubescence.

Hab. Moreton Bay.

In the British Museum.

2. *Dimorphoptera nigripennis.*

Male. Length 7½ lines. Black: with dark brown wings. Head ovate; slightly shining, and closely punctured; the face and cheeks thinly covered with erect griseous pubescence; the antennæ rather stout, extending to the apex of the scutellum; the mandibles bidentate. Thorax as long as the abdomen, and thinly sprinkled with short griseous pubescence; closely punctured; the tibiæ and tarsi with short griseous pile; wings very dark brown, palest at their apical margins. Abdomen oblong-ovate, smooth and shining, having violet reflections in certain lights.

Hab. Australia.

This is the only example of a supposed male of this genus that I have seen; it is in the National Museum; it differs from the male of *Myzine*, in the short semi-ovate form of the abdomen, and in being destitute of the spine at the apex.

3. *Dimorphoptera morosa.*

Female. Length 10 lines. Black and shining, with dark fuscous wings. Head narrower than the thorax, shining on the vertex, the face coarsely punctured; mandibles very obscurely ferruginous towards the tips; the clypeus, cheeks, and posterior margin of the vertex with cinereous pubescence. Thorax: the prothorax and scutellum coarsely punctured, the former thinly clothed with cinereous pubescence; the mesothorax shining, and with a few scattered punctures; the tibiæ and tarsi strongly spinose, the calcaria at the apex of the tibiæ white; wings dark fuscous. Abdomen shining, and with fine scattered punctures; the apical segment covered with short rigid spines.

Hab. Australia (Melbourne ?).

In the British Museum.

4. *Dimorphoptera clypeata.*

Female. Length 8 lines. Black: the abdomen banded with orange. Head and thorax with thin cinereous pubescence; the clypeus, inner margin of the eyes, and a line behind them, yellow; the mandibles fringed beneath with stiff ferruginous hairs; the wings fusco-hyaline, the nervures black, the posterior wings palest; the legs with a glittering white scattered pubescence, the calcaria white; the posterior femora incrassate, compressed beneath into a thin plate, the tibiæ with a row of blunt teeth outside. Abdomen smooth and shining, a few scattered punctures on the fifth segment, and along the apical margins of the other segments; the second, third, and fourth segments with a broad orange band, not extending to the posterior margins, the bands notched in the middle posteriorly, and curved to the sides; the apical segment densely covered with ferruginous hair; beneath, the second and third segments have a broad basal band notched in the middle posteriorly.

Hab. Champion Bay.

5. *Dimorphoptera fastuosa.*

Female. Length 7 lines. Ferruginous: the head, tip of the abdomen, mesothorax, and scutellum, black. The mandibles, anterior margin of the clypeus, and the scape of the antennæ, ferruginous; tips of the mandibles black. Thorax: the prothorax, sides, and legs, with ferruginous pubescence; the spines at the apex of the tibiæ pale testaceous; the intermediate and posterior thickly spinose outside; the wings fulvo-hyaline, the nervures ferruginous. Abdomen punctured, most strongly and closely towards the apex, the apical segment with coarse longitudinal punctures; its tip rufo-piceous, smooth, and shining; the wings extending to two-thirds the length of the abdomen.

Hab. Champion Bay.

In the British Museum.

This species has the wings shorter than the abdomen.

Gen. Scolia.

Scolia (*Dielis*, Saussure) *intrudens*.

Female. Length 7 lines. Black, with the second and third segments of the abdomen yellow. A transverse yellow interrupted line on the vertex of the head above the ocelli, a narrow yellow line behind the eyes, and a line on the lower part of their inner margin; the mandibles, and antennæ beneath, ferruginous. The mesothorax thinly covered with ferruginous hair; the tibiæ and tarsi ferruginous, the latter most brightly so; the calcaria pale testaceous; the wings fusco-ferruginous; the nervures ferruginous; two submarginal cells, and two recurrent nervures. Abdomen: the apical margin of the first segment narrowly, and the two following segments entirely yellow, on each side of these segments a short narrow ferruginous line, the third segment has also a faint minute ferruginous spot a little within the outer line; the apical segment longitudinally striated; beneath, shining black, the margins of the segments fringed with white hairs.

Hab. Champion Bay.

Fam. POMPILIDÆ.

Gen. Pompilus.

1. *Pompilus veloæ.*

Male. Length 5¼ lines. Black, with yellow wings. Head: the sides of the clypeus, and of the face and labrum, yellow; tips of the mandibles ferruginous; the head has a thin griseous pubescence, with some longer hairs on the cheeks. Thorax: rounded anteriorly, the posterior margin of the prothorax yellow and angulated; the metathorax truncate: the entire insect has a covering of cinerous pubescence, which is most dense on the underside of the thorax; the anterior tibiæ and tarsi ferruginous; the second, third, and fourth joints of the intermediate tarsi ferruginous, with their tips black; the spines at the apex of the tibiæ pale testaceous; wings

fulvo-hyaline, with their apical margins bordered with fuscous; the nervures ferruginous. Abdomen, smooth and slightly shining, a cream-coloured ovate spot on each side of the third segment at its basal margin.

Hab. Australia.

In the British Museum.

2. *Pompilus lugubris.*

Female. Length 5¼ lines. Black, with yellow antennæ. Head and thorax semi-opaque, the abdomen shining. The antennæ inserted at the sides of a bilobate prominence on the face; the front and cheeks with thinly scattered cinereous hairs. Thorax: the sides, and beneath, with scattered cinereous hairs; wings dark fuscous, their apex as well as the externo-medial cell palest, a darker cloud also crosses the anterior wings at the second submarginal cell. The abdomen with a short petiole.

Hab. Champion Bay.

In the British Museum.

3. *Pompilus distinctus.*

Male. Length 5 lines. Black: the prothorax, and the second and following segments of the abdomen, reddish-yellow. Head: the antennæ, clypeus, labrum, mandibles, a spot between the antennæ, and a line at the inner and outer orbits of the eyes, orange-yellow. The prothorax above, the apex of the femora, the tibiæ and tarsi, orange-yellow; the wings fulvo-hyaline. Abdomen orange-yellow, with the basal segment black.

Hab. Champion Bay.

In the British Museum.

4. *Pompilus tricolor.*

Male. Length 6 lines. Black: variegated with yellow and ferruginous. Head: antennæ ferruginous, fuscous above; the face, scape in front, and behind the eyes, yellow. Thorax black: the prothorax, a ∨-shaped mark on the disc of the mesothorax, the tegulæ and an epaulet over them, the scutellum, a line on the post-scutellum with a minute dot at each end of the line, and the apex

of the metathorax, yellow; the anterior and intermediate coxæ in front, with the tibiæ and tarsi, as well as the posterior tibiæ and the base of the first joint of the tarsi, yellow; the anterior and intermediate femora reddish, as well as the base of the posterior femora; the posterior tarsi dusky; wings fulvo-hyaline, their apex fuscous. Abdomen: the first and fourth segments black, the rest yellow; the apical margins of the second and third fusco-ferruginous.

Hab. Adelaide.

In the British Museum.

5. *Pompilus diversus.*

Female. Length 4½ lines. Black: with the head and thorax blood-red. The face with a silvery-white pubescence; the tips of the mandibles and the antennæ black, the scape red beneath; the head a little wider than the thorax. The metathorax rounded behind; the legs obscure fusco-ferruginous, the anterior tibiæ and tarsi brightest; the wings fuscous, palest at their base. Abdomen covered with a silky slate-coloured pile.

Hab. Sydney, or Moreton Bay.

In the British Museum.

6. *Pompilus irritabilis.*

Female. Length 4¾-6 lines. Black: the wings with a yellow fascia; the body covered with a fine silvery silky pile, very bright and glittering in certain lights, and most dense on the face, and body beneath. Thorax: the posterior margin of the prothorax rounded; wings fusco-hyaline, with a broad yellow fascia towards the apex of the anterior wings, enclosing the marginal, two submarginal, and apical half of the third discoidal cell; the fascia does not quite extend to the posterior margin of the wing: the spines at the apex of the tibiæ pale testaceous; the extreme apex of the anterior tibiæ and joints of the tarsi, as well as the apex of the intermediate tibiæ, ferruginous. Abdomen rounded at the base.

The male closely resembles the female, but has the anterior tibiæ and tarsi, as well as the antennæ, ferruginous; the posterior tibiæ with a pale spot at their base.

Hab. Australia.

In the British Museum.

7. *Pompilus infandus.*

Male. Length 8¼ lines. Black, with the metathorax and base of the abdomen ferruginous. Head: narrower than the thorax; the antennæ, palpi, and tips of the mandibles, ferruginous; the face covered with silvery pile. Thorax: the posterior margin of the prothorax angulated; the wings fulvo-hyaline, the nervures ferruginous; the metathorax, which is ferruginous above, is tuberculate on each side; the legs ferruginous. Abdomen sub-petiolate, the petiole black; the first and second segments ferruginous, except the posterior margin of the second, which is black, the following segments also black; beneath, coloured the same as above.

Hab. Australia.

In the British Museum.

8. *Pompilus vespoides.*

Female. Length 7½-10 lines. Black: the head, legs, and abdomen except its base, ferruginous. Head a little wider than the thorax, a black spot on the front enclosing the ocelli; antennæ of the same colour as the head; tips of the mandibles black. Thorax: rounded anteriorly and posteriorly; pilose, with, in certain lights, a violet lustre; wings flavo-hyaline, their apical margins with a narrow fuscous border; the coxæ, trochanters and base of the femora, black. Abdomen: the basal segment black; the apical margins of the second, third, and fourth segments slightly fuscous, forming in the middle of each segment an ill-defined angular shape; beneath, black, except at the extreme apex.

Hab. South Australia (Moreton Bay?).

In the British Museum.

9. *Pompilus melancholicus.*

Female. Length 5 lines. Black, and ornamented with cinereous spots and bands. Head: rather wider than the thorax, the face and cheeks covered with cinereous pile; tips of the mandibles ferruginous; the clypeus smooth and shining at its anterior margin. Thorax: the prothorax in front, its posterior margin, the post-scutellum, and two oblique pubescent spots on the metathorax, cinereous; the coxæ and femora beneath,

cinereous; the tibiæ and tarsi cinereous above; wings fuscous, with their apical margins darkest. Abdomen smooth and shining, with cinereous fasciæ on the apical margins of the segments.

The male resembles the female.

Hab. Champion Bay.

In the British Museum.

Gen. Priocnemis.

1. *Priocnemis affectata.*

Female. Length 10 lines. Black, with the two basal segments of the abdomen ferruginous, wings maculated. Head as wide as the thorax, the face and cheeks with a fine griseous pile, the head thinly sprinkled with fuscous hairs; the antennæ bright ferruginous; the labrum, mandibles, and palpi, dark ferruginous. Thorax: the posterior margin of the prothorax arched; the sides parallel; the metathorax, the coxæ, and sides, covered with a fine glossy pile, reflecting golden tints in different lights; the truncation of the metathorax smooth, not shining, the upper surface transversely grooved; wings fulvo-hyaline, their apical margins with a narrow fuscous border, and also a quadrate fuscous spot at the apex of the third discoidal cell, extending upwards into the corners of the second and third sub-marginals; legs bright ferruginous, with black coxæ. Abdomen: the extreme base, also the base of the second segment in the middle, its apical margin broadly, and the following segments entirely black; the apical segment with bright ferruginous hairs.

Hab. South Australia (Moreton Bay?).

In the British Museum.

2. *Priocnemis defensor.*

Female. Length 7-10 lines. Black, with ferruginous wings. Head narrower than the thorax, antennæ incrassate; the body pilose, in some lights having a dull violet lustre. Thorax: truncate posteriorly, slightly rounded anteriorly; the posterior margin of the prothorax curved; the sides parallel; the wings ferruginous,

their bases and apical margins narrowly dark fuscous; the nervures ferruginous, black at the extreme base of the anterior wings; the metathorax impunctate, and with an impressed line above, in the middle.

Hab. South Australia.

In the British Museum.

3. *Priocnemis Polydorus.*

Female. Length 11 lines. Black: the wings fuscous, fasciated with yellow. Head rather narrower than the thorax; the face below the insertion of the antennæ covered with griseous pile, above the antennæ with short fuscous pubescence, the vertex not pilose; the cheeks with a thin, long, griseous pubescence; the antennæ with a fine fuscous pile. Thorax: oblong, the sides parallel, the posterior margin of the prothorax rounded; opaque, the sides beneath, as well as the legs, with a shining griseous pile, intermixed with fine long griseous pubescence; the metathorax truncate; above, with a central impressed line, the truncation transversely finely rugose; wings dark fuscous, the anterior pair with a broad yellow fascia, extending from the base to the apex of the marginal cell, and narrowing posteriorly. Abdomen smooth and shining, the apical segment opaque and punctured; the basal segment with a patch of silvery-white hair on its margin laterally, sometimes also on the second segment.

Hab. Australia (Moreton Bay?).

In the British Museum.

4. *Priocnemis ephippiata.*

Female. Length 8 lines. Black, with the mesothorax and scutellum red. Head: the flagellum orange-yellow; ths tips of the mandibles ferruginous; the clypeus and face, as high as the insertion of the antennæ, with a thin silvery-white pile. Thorax: the mesothorax, scutellum, and post-scutellum, blood-red; the wings fuscous; the spines at the apex of the tibiæ pale testaceous. Abdomen shining, the apical margins of the segments narrowly fringed with silvery-white pubescence. The insect has a silvery pile beneath.

Hab. Adelaide.

In the British Museum.

Fam. SPHEGIDÆ.

Gen. Ammophila.

1. *Ammophila impatiens.*

Female. Length 1 inch. Head and thorax black, legs and petiole of the abdomen ferruginous. Head: the scape ferruginous in front, the face covered with silvery pile; thinly sprinkled with fuscous hairs. Thorax: pro- and meso-thorax coarsely striated transversely, the metathorax obliquely so; the femora, tibiæ, and basal half of the first joint of the tarsi, ferruginous, the other joints black; wings fulvo-hyaline, their nervures ferruginous, tips of the wings clouded. Abdomen: the petiole elongate, and, as well as the first segment, bright ferruginous, a black spot in the middle of the petiole; the apical joints of the abdomen blue-black.

Hab. Champion Bay.

In the British Museum.

2. *Ammophila ardens.*

Female. Length 13 lines. Black: the legs and petiole and first segment of the abdomen ferruginous. Head: the antennæ, palpi, and basal half of the mandibles ferruginous, the flagellum fuscous towards the apex; the face with golden pile. Thorax: the prothorax and metathorax transversely striated; the posterior portion of the mesothorax in the middle, the scutellum and post-scutellum longitudinally striated; the sides and beneath rugose; the legs bright ferruginous; the tarsi densely spinose, the spines black; the anterior and intermediate coxæ behind, and the posterior pair in front, black; wings fulvo-hyaline, the anterior pair clouded at their apex. Abdomen; the petiole and first segment bright ferruginous, the former with a black spot in the middle; the following segments blue-black; the petiole elongate.

Hab. Swan River.

In the British Museum.

Gen. Sphex.

Sphex argentifrons.

Female. Length 9½ lines. Head and thorax black, the abdomen red. Head: the face covered with bright silvery pile, interspersed with long thin white pubescence, which also thinly covers the whole head; the mandibles ferruginous. The thorax clothed with pale glittering pubescence, which is most dense on the metathorax, and most sparing on the mesothorax above; the legs bright ferruginous, with the coxæ, and apical half of the posterior tibiæ black; the wings fulvo-hyaline, their apical margins faintly clouded, the nervures ferruginous. The abdomen bright ferruginous.

Hab. Champion Bay.

In the British Museum.

Fam. LARRIDÆ.

Gen. Pison.

Pison nitidus.

Female. Length 6 lines. Black: the mesothorax and abdomen shining. Head opaque black, the face with a silvery-white pubescence. Thorax: beneath, the sides and the metathorax with a thin cinereous pubescence, the legs with a glittering cinereous pile; the mesothorax finely punctured; the metathorax with a central deeply impressed channel; above, with oblique elongate punctures, the truncation strongly punctured, the punctures elongate and transverse; the wings dark fuscous, subhyaline at their base. Abdomen delicately punctured, the apical margins of the segments with silvery-white fasciæ; beneath, smooth and shining.

Hab. Champion Bay.

Fam. NYSSONIDÆ.

Gen. Gorytes.

Gorytes ornatus.

Female. Length 5 lines. Black: variegated with yellow and red. Head: the clypeus, scape, and mandibles yellow; antennæ much thickened towards the apex, black

above and ferruginous beneath; the eyes ochraceous. Thorax: the collar, tubercles, a line beneath the wings which has a quadrate notch in the middle, a line on the sides of the mesothorax continued over the tegulæ, the scutellum and post-scutellum, yellow; the anterior and intermediate legs, the tarsi and posterior tibiæ outside, yellow; the intermediate coxæ, trochanters, the anterior and intermediate femora above, the posterior coxæ, trochanters, and femora, ferruginous; the posterior tibiæ and basal joint of the tarsi black; the tarsal claws ferruginous, the pulvillus between them black; the wings hyaline. Abdomen: the second segment ferruginous, a broad yellow band on the apical margin of the basal segment; a large yellow subovate macula on each side of the second segment, from which a short narrow line, terminating in a point, runs inwards; the apical margins of the following segments bordered with yellow.

Hab. Champion Bay.

Fam. CRABRONIDÆ.

Gen. Crabro.

1. *Crabro neglectus.*

Male. Length 4 lines. Black; with orange bands on the abdomen. Head wider than the thorax; the clypeus silvery; the scape yellow. Thorax: an interrupted orange line on the collar: the anterior legs, and the intermediate tibiæ and tarsi, ferruginous; the anterior tibiæ white at their apex; wings fusco-hyaline, the nervures black; the metathorax coarsely rugose. Abdomen: smooth and shining, an interrupted orange line on the second segment near the basal margin, and an entire fascia at the basal margin of the fourth segment: the apical margins of the following segments narrowly rufo-testaceous.

Hab. South Australia.

In the British Museum.

2. *Crabro nigro-maculatus.*

Female. Length $3\frac{1}{2}$ lines. Black: the abdomen ferruginous, with a large black macula. Head as wide as the thorax; the ocelli in a triangle, the scape, and three

or four joints of the flagellum, ferruginous; a yellow line on the mandibles at their base. Thorax: the knees, tibiæ, and tarsi ferruginous; the basal joint of the anterior tarsi black; wings hyaline, the nervures fuscous. Abdomen: ferruginous; a large black macula above, divided across the middle at the apical margin of the second segment.

Hab. Moreton Bay.

In the British Museum.

3. *Crabro tridentatus.*

Female. Length 7 lines. Black: the abdomen with orange bands. Head: quadrate, wider than the thorax; the clypeus and cheeks with a silvery pile, the former with three teeth at its anterior margin, one central, the others at the lateral angles; the scape yellow; the ocelli in a curve. Thorax: an interrupted orange line on the collar; the tibiæ, tarsi, and femora above, ferruginous; wings sub-hyaline, the nervures fuscous. Abdomen: an orange fascia at the basal margin of the second segment, the fourth and following segments entirely orange.

Hab. Moreton Bay.

In the British Museum.

Fam. MASARIDÆ.

Gen. Paragia.

1. *Paragia vespiformis.*

Smith, Trans. Ent. Soc. 3rd Ser. ii. 393, ♀.

Male. Length 7 lines. Opaque black: the clypeus, mandibles, scape of the antennæ in front, and a line on each side of the face along the inner margin of the eyes but not extending above the insertion of the antennæ, yellow. A narrow line on the anterior margin of the prothorax, the inner margin of the tegulæ, and the posterior margin of the scutellum, yellow; the coxæ, femora, intermediate and posterior tibiæ, yellow beneath; a narrow yellow line beneath the basal joint of the intermediate and posterior tarsi; the wings sub-hyaline, the nervures

black. The basal segment of the abdomen concave in front, elevated on each side; the elevations acutely margined laterally, yellow above, and at the sides, outwardly; the five following segments with a yellow band on their apical margins, slightly interrupted in the middle; the apical segment black. Beneath, yellow; a blunt yellow tooth, or spine, projecting from the middle of the second segment, and slightly curved towards the apex of the abdomen; the basal segment black.

The female of this species was described from a specimen received from the Swan River; it is in the National Collection. Both sexes were sent by Mr. Du Boulay in a small collection, presented to me by that gentleman; they are from Champion Bay.

2. *Paragia morosa.*

Female. Length 8 lines. Reddish-yellow, not shining; the ocelli and teeth of the mandibles black. The mesothorax with a central lanceolate patch, and the suture at the base of the scutellum, black; the pectus black; the anterior wings ferruginous, becoming subhyaline at their apical margins; the marginal cell occupied by a black macula; the metathorax produced laterally above, into an acute angle. Abdomen; the apical margins of the second and third segments very narrowly bordered with black, the basal margin of the third slightly so, but becoming laterally more broadly so; the third segment is also black at the base laterally; the third and fourth segments are black beneath, the third having the apical margin yellow, most broadly so in the middle and at the sides.

Hab. Champion Bay.

3. *Paragia concinna.*

Female. Length 5 lines. Black and orange. The head black, with the base of the mandibles, labrum, clypeus, a bell-shaped spot between the antennæ, the inner margins of the eyes, and a broad streak behind them, orange-red; the scape of the antennæ ferruginous. The thorax black, with the prothorax above, the tegulæ and a narrow epaulet over them, an elongate spot on

the mesothorax behind, and a minute one on each side of it, the scutellum, sides of the metathorax, and the legs, orange; the anterior coxæ black; wings sub-hyaline, with a fuscous cloud along their anterior margins, which becomes black in the marginal cell; the nervures ferruginous towards the base of the wings, black beyond. Abdomen orange; the second segment, and the base of the fourth, black; the base of the second segment orange, interrupted in the middle. Beneath, the second, fourth, and fifth segments black.

Hab. Champion Bay.

4. *Paragia nasuta.*

Female. Length 6½ lines. Black: the face ornamented with yellow, and the body with orange-red markings. Head: the anterior margin of the clypeus produced; a transverse spot at its base, and an ovate one above, between the antennæ, yellow; a yellow spot behind the eyes; the mandibles ferruginous at their apex, and sub-dentate. Thorax: the prothorax above, a sub-quadrate spot beneath the wings, the tegulæ and a line on the mesothorax at their margin, the scutellum and an abbreviated line before it, orange-red; the metathorax with a blunt orange-red tooth on each side, and a yellow line on the post-scutellum; the tibiæ, tarsi and femora, red, the latter more or less black beneath; the wings hyaline, the anterior margin of the superior pair fuscous. Abdomen: a broad orange-red band on the apical margins of the first and third segments; the apical segment of a testaceous red, except at its extreme base.

The male is rather smaller, and has the clypeus, a spot above it, and a line on the scape in front, white; of two examples, one has an abbreviated white line on the inner margins of the eyes; the mandibles white outside; the central red line before the scutellum obsolete; in other respects resembling the female.

This species closely resembles *P. deceptor*, but that insect has the mandibles furnished with three prominent teeth, and the basal segment of the abdomen is much narrower.

Hab. Champion Bay.

In the British Museum.

Fam. ANDRENIDÆ.

Gen. Lamprocolletes.

Lamprocolletes rubellus.

Male. Length 5¼ lines. Head and thorax black, the abdomen ferruginous. The face densely covered with golden yellow pubescence, that on the cheeks paler; the mandibles and antennæ ferruginous, the latter dusky above. Thorax densely pubescent, ochraceous above, much paler beneath; wings fulvo-hyaline, the nervures ferruginous; legs pale ferruginous. Abdomen ferruginous, the basal segment thinly covered with pale pubescence, margins of the segments testaceous, and fringed with whitish pubescence.

Hab. West Australia.

Gen. Œstropsis, n. g.

Head transverse, narrower than the thorax; ocelli in a curve on the vertex; the antennæ clavate, with the scape short and stout, one-third shorter than the third joint, which is much attenuated, the following joints filiform. Mentum elongate, labium short and lanceolate, about the same length as the paraglossæ, which are somewhat pear-shaped, and pubescent as well as the labium. Maxillary palpi six-jointed, the basal joint being longer and stouter than the others, each in succession being shorter and more slender. Thorax ovate, the wings with one elongate narrow marginal cell, rounded at its apex; three submarginal cells, the first one-third longer than the second, the second narrowed towards the marginal, the third rather shorter than the second, and narrowed towards the marginal; the recurrent nervures received in the middle of the second and third submarginal cells. Abdomen sub-conical. (Male.)

1. *Œstropsis pubescens.*

Male. Length 6-7 lines. Black: densely clothed with ochraceous pubescence; in some examples the pubescence is darker, being a dirty yellow. Antennæ pale ferruginous, fuscous, or black above, except the two or three apical segments; tips of the mandibles rufo-piceous.

Thorax densely pubescent; legs pale ferruginous, the intermediate coxæ and femora behind, as well as the posterior femora, dark fuscous or black, the tips of the latter ferruginous outside; wings hyaline, the nervures ferruginous, the costal black. Abdomen with a nigro-æneous hue, all the segments densely fringed with pubescence; beneath, thinly pubescent.

Hab. Champion Bay, and South Australia.

In the British Museum.

Gen. Stenotritus.

Stenotritus smaragdinus.

Female. Length 8½ lines. Bright green, finely shagreened, not shining; the ocelli black, placed forwards in a curve, an abbreviated carina in front of the anterior one; a dark space on each side of the ocelli between them and the eyes; the clypeus with purple reflections; antennæ black. The metathorax, the thorax beneath and at the sides, with white pubescence; the legs have a pale pubescence, that on the intermediate and posterior tibiæ and tarsi short and dense. The wings hyaline. The abdomen has a thick dark fuscous fimbria at the apex; on the second segment on each side at the basal margin is a dark fuscous impressed spot; beneath, the apical margins of the segments are fringed with pale pubescence, that on the apical segment being dark fuscous.

Hab. Champion Bay.

In the British Museum.

The insect from which the generic characters were drawn, (Cat. Hymenop. p. 119) was not in perfect preservation; the tongue was wanting; but the remarkable pectinate spurs on the intermediate and posterior tibiæ, in conjunction with other peculiarities, were deemed sufficient characters whereby it might be recognized; the second species now described is also imperfect, the tongue, part of the antennæ, and one of the anterior legs are wanting; but in every particular in which I have the means of comparing this species with the type *S. elegans*, they agree; both are from Australia.

Fam. APIDÆ.

Gen. Lithurgus.

Lithurgus cognatus.

Female. Length 7½ lines. Black, with ferruginous pubescence on the apical segment of the abdomen. Head rather wider than the thorax, closely punctured; the face covered with white pubescence, that on the cheeks is of the same colour, but longer, and more sparing; the face with a transverse bituberculate elevation at the base of the clypeus; an elevated ridge on each side of the central tubercle, curving down to the base of the mandibles; the mandibles short, stout, and bidentate; the flagellum of the antennæ obscurely fulvous beneath; the labrum of a broad lanceolate form, and fringed with ferruginous hair. Thorax: the pubescence pale cinereous, that on the femora and tibiæ is of the same colour, that on the tarsi dark brown; on the basal joint of the posterior tarsi within, it is tinged with ferruginous; the posterior tibiæ outside are roughened with a multitude of short stout teeth or spines; wings hyaline, their nervures black. Abdomen: the apical margins of the segments narrowly fringed with pale ochraceous pubescence; the apical segment as well as the abdomen beneath clothed with bright ferruginous.

Male. Similarly coloured to the female; the tarsi elongate, the posterior coxæ and femora incrassate; the basal joint of the posterior tarsi has, in the middle within, a tuberculate blunt flattened process; the tibiæ are very stout, and slightly curved.

Hab. Champion Bay.

In the British Museum.

Although both sexes are considerably larger than *Lithurgus rubricatus*, described in my Catalogue of *Hymenoptera*, from North Australia, I am inclined to believe this may be a finely developed form of the same species; the tubercle on the face of the female, which is rudimentary in *L. rubricatus*, is the most marked distinctive character.

Gen. Megachile.

1. *Megachile monstrosa.*

Female. Length 10 lines. Black, with fuscous wings, sub-hyaline at their base. Head: large, quadrate, as wide as the thorax; mandibles very stout, with three teeth at their apex, which is obliquely truncate; the clypeus elevated on each side, at the base, into a stout tubercle or tooth, acute at its apex; the cheeks armed with a stout acute bent tooth; the head rugose behind the eyes. Thorax rugose; the wings dark fuscous, sub-hyaline at their basal and apical margins; beneath, the sides and the metathorax clothed with griseous pubescence; the legs have a stout griseous pile; the basal joint of the tarsi with a short, dense, fulvous pubescence. The abdomen clothed beneath with dense, pale, glittering fulvous pubescence; the basal segment deeply concave in front. and with a patch of pale pubescence on each side above.

Hab. Champion Bay.

In the British Museum.

2. *Megachile fabricator.*

Female. Length 6½ lines. Black, wings with their apical half dark fuscous, basal segment of the abdomen covered with white pubescence. Head and thorax opaque, the abdomen slightly shining; the face, as high as the ocelli, with pale ochraceous pubescence, that on the clypeus black; the mandibles with two stout teeth at their apex, and a third, more slender and acute within. Thorax: the legs with short, pale, glittering pubescence, that on the posterior and intermediate basal joint of the tarsi black within; the same joint of the anterior tarsi has it ferruginous. Abdomen: the basal segment, the basal margin of the second, and that of the third segment laterally, with white pubescence; beneath, clothed with bright white pubescence, that on the apical segment black, with a few white hairs in the middle.

Male. Length 5 lines. Closely resembles the female; the mandibles with a single tooth at the apex; the basal joint of the anterior tarsi broadly expanded into a thin semi-transparent plate; all the joints fringed behind with long pale pubescence, towards the base of the first joint it is fuscous; the apical segment rounded at its margin, with a small acute tooth in the middle.

Hab. Champion Bay.

In the British Museum.

3. *Megachile fumipennis.*

Female. Length 7 lines. Black: the basal segment of the abdomen clothed with white pubescence, the wings dark fuscous. Head closely and finely punctured, the vertex with larger punctures interspersed; the face thickly covered with white pubescence; the mandibles stout, having elongate punctures, and a single tooth at the apex. Thorax: the mesothorax roughened with confluent punctures; the prothorax, the sides, and the metathorax with white pubescence; the legs have a short black pubescence; the tarsal claws ferruginous. Abdomen clothed beneath with black pubescence.

Hab. Champion Bay.

In the British Museum.

4. *Megachile sexmaculata.*

Female. Length 5½ lines. Black: the face with golden yellow pubescence, the abdomen with six white maculæ, the apex ferruginous. The mandibles with longitudinal strigose punctures, a single tooth at the apex, and fringed beneath with ferruginous hairs; the cheeks with cinereous pubescence. The thorax with cinereous pubescence, as well as the legs; the basal joints of the tarsi densely clothed above with short cinereous pubescence, but with pale fulvous beneath; wings fusco-hyaline, the nervures black. Abdomen: a patch of snow-white pubescence on each side of the three basal segments; a large ovate ferruginous spot on the apex, occupying the apical and a large portion of the fifth segment; the pollen brush beneath is silvery white.

Hab. Champion Bay.

In the British Museum.

5. *Megachile imitata.*

Female. Length 6 lines. Black, and closely resembling *M. argentata*. The face clothed with pale yellow pubescence, that on the cheeks silvery. The thorax with pale yellow pubescence above, sparing on the disc; on the sides and beneath it is whitish, as is also the thin short pubescence on the legs above, on the tarsi beneath it is fulvous; the wings sub-hyaline, the nervures black.

Abdomen: the apical margins of the segments with fasciæ of pale yellow pubescence; beneath, clothed with silvery white pubescence.

Hab. Champion Bay.

In the British Museum.

6. *Megachile nasuta.*

Female. Length 6 lines. Black: with the tip of the abdomen red. Head quadrate, closely and evenly punctured; the clypeus elevated, forming in front a smooth shining hollow space, coarsely punctured above, the margin irregular, sub-dentate; the face with cinereous pubescence. The pubescence on the sides of the thorax and on the legs, cinereous, nearly white, that on the basal joint of the tarsi within, pale fulvous; the claws ferruginous. Abdomen: the basal segment covered with white pubescence, the apical one has a fulvous patch above; beneath, clothed with pale fulvous pubescence.

Hab. Champion Bay.

In the British Museum.

Gen. Crocisa.

Crocisa albo-maculata.

Female. Length 6 lines. Black, variegated with snow white spots. Head clothed with white pubescence, a snow-white spot at the base of the mandibles. Thorax: the sides clothed with white pubescence; in the white is a small ovate black spot, and a transverse black line; the mesothorax with a white ovate spot on each side in front, an oblong line between, another in front of the tegulæ, and four ovate ones on the disc; the scutellum deeply notched, a tuft of white hair in the notch; wings fuscous, the posterior wings and base of the anterior pair subhyaline; also two or three small hyaline spots just beyond the enclosed cells of the front wings; the tibiæ and basal joint of the tarsi white outside. Abdomen: a white spot on each side at the basal margin, and two united spots on each side of the first segment; the second segment has a broad interrupted white fascia on its apical margin, which also runs up the sides laterally; the third and fourth segments have two ovate spots on each side, and the fifth segment a simple spot; the segments have a spot on each side beneath.

Hab. Champion Bay.

XII. *Descriptions of New Genera and Species of* Heteromera. By Frederick Bates.

[Read 1st June and 6th July, 1868.]

Family TENEBRIONIDÆ.

Sub.-fam. CŒLOMETOPINÆ.

Hypaulax, n. g.

Mentum not borne on a projection of the submentum, its base and the bases of the maxillæ on a nearly even plane; of variable form, usually with an angular notch in the middle of the fore-margin, front angles rounded, narrowed behind, and impressed down the median line;* *maxillæ* having the inner lobe armed with a strong claw, unequally bifid, whereof the upper prong is much shorter than the lower;† *labium* somewhat prominent, rounded or broadly emarginate in front, and ciliate in the latter case: last joint of the labial palpi sub-triangular, that of the maxillary moderately securiform; *mandibles* bifid at the end; *labrum* transverse, rather prominent, sinuous in front, with the angles rounded. *Head* more or less prominent, but little contracted behind, more or less convex and smooth between the eyes; antennary orbits moderately prominent, rounded, with an impressed line within, in front of the eye: *front* and *epistome* together trapeziform, the latter very short, broadly emarginate in front, fore angles rounded, separated from the former by a lightly impressed lunate or subangulate line; *cheeks* prominent, with a deep channel or groove beneath,

* There also occurs here (as in some species of *Nyctobates*, and in a crowd of other genera), that peculiar form of mentum composed of a central portion large and convex, and two smaller flat pieces situate on each side at the back, which might appropriately be termed "the wings" of the mentum. I propose to call this form of mentum "winged," as, in its most exaggerated form, it can scarcely be considered *trilobed*.

† The same form exists in the genera *Cœlometopus*, *Iphthimus*, *Cœlocnemis*, &c. Lacordaire says of this last genus "mâchoires inermes":—in the two species that I have dissected, there is distinctly visible a short obtuse claw, which is unequally bifid.

which, skirting the inferior portion of the eye near its anterior margin, extends itself more or less in a curved line towards the base of the submentum; *throat* deeply and transversely channelled (as in *Cœlometopus*); *eyes* more or less distant from the prothorax, transverse, small, somewhat contracted below by an expansion of the cheeks. *Antennæ* rather short, third joint a little longer than the following, nodose at the end, 4-6 or 4-7 obconic, 8-11 gradually broader, compact, depressed. *Prothorax* variable; generally it is closely applied to the elytra, more or less convex, narrowed in front and behind, rounded at the sides, truncate at the apex, bisinuate at the base, with the hind angles acute: base and sides margined, the latter obtusely crenulate or sinuous in the middle. *Scutellum* small, convex, transverse. *Elytra* oblong, but little wider than the thorax at the base, which is thickly margined, broadest behind the middle, and sinuous towards the apex in consequence of a slight expansion of its epipleura, depressed at the shoulders, but with the humeral angle rather strongly in relief, and embracing the hind angle of the thorax; *epipleuræ* entire. *Legs* moderate; fore and intermediate *tibiæ* more or less arched, obsoletely spurred; *tarsi* with the last joint as long as the preceding united, first joint of the posterior pair a little elongate; *intercoxal process* broad, and gradually arched at the apex; *mesosternum* sub-horizontal, broadly concave in front; *prosternal process* broad, strongly bisulcate, truncate or obtusely rounded or pointed behind; *metasternum* short; *body* wingless.

This genus has all the essential characters of the sub-family under which I have placed it, notwithstanding that it has many points which closely connect it with *Iphthimus*. Having the epipleuræ entire, it must, I suppose, range by the side of *Polypleurus*; and in that case it will, I think, be necessary to remove both genera to the end of the sub-family, to bring them into closer proximity with *Iphthimus* on the one side, and *Cœlometopus* on the other. The species are all Australian.

I know not the Australian genus *Baryscelis* (Dej. Cat.). Boisduval's descriptions of the two species that enter therein are so short and unsatisfactory, as to be quite useless.

1. *Hypaulax marginata*, n. sp.

Length 10½ lines. Oblong, deep shining black. Head very convex between the eyes, smooth; epistome separated from the front by a sub-angulate line; cheeks with a deep curved groove, extending half-way across, and terminating in a deep elongate pit or fovea: mentum subquadrate, notched in front, fore angles rounded, somewhat narrowed behind, the median line furrowed; labium broadly emarginate in front, ciliate. Thorax moderately convex, not longer than broad, moderately contracted in front and behind, rounded at the sides, which are rather broadly margined, and obtusely crenulate in the middle; hind angles prominent and pointed; a shallow impression on each side the median line near the base: under a powerful lens both the head and prothorax appear very finely and sparingly punctate. Elytra oblong, a little broader than the thorax at the base, which is sinuous and very thickly margined; very gradually widening for three-fourths of their length, then narrowed to the apex; shoulders depressed, but with the humeral angles very strongly in relief; on each elytron nine rows of rather deep foveate impressions, which become smaller and more punctiform as they approach the apex; the ninth row (which is completely marginal) is joined to the first at the extreme apex, the seventh to the second, the sixth to the third, and the fifth to the fourth, meeting at gradually receding distances from the apex: there is also a short row (consisting of two or three impressions) by the scutellum; the intervals between the rows of impressions are sub-convex. Prosternal process angularly truncate behind; legs rather robust, fore and intermediate tibiæ moderately arched. Body beneath, and legs, shining black, with the tarsi, antennæ, and palpi castaneous.

Hab.—Queensland (Clarence).

1. *Hypaulax sinuaticollis*, n. sp.

Length 8¼ lines. Similar to the preceding, but smaller and narrower, subnitid. Thorax longer than broad, less rounded at the sides, which are sinuous only, and not obtusely crenulate; less contracted behind, with the hind angles much less prominent and pointed; the

two shallow impressions on the discs near the base are also wanting in the present species. Elytra narrower, less sinuous at the base, more convex, not so wide, relatively, behind the middle, with the rows of impressions much smaller and more punctiform; the punctures more or less connected in line by a faint stria, and the intervals flatter. Prosternal process squarely truncate behind. Body shining black beneath, with the legs entirely, the antennæ, and the labrum castaneous.

Hab.—Queensland (Clarence).

3. *Hypaulax tarda*, n. sp.

Length 7 lines. Oblong, black, subnitid. Head broad, but little convex, more visibly punctate than in the two preceding species, the labrum very coarsely so; epistome separated from the front by a sub-angulate line; cheeks with a simple curved linear groove, not terminating in a pit or fovea, nor extending so far across as in the preceding species: mentum having its anterior angles obliquely truncate, strongly notched at the apex, contracted behind, obscurely furrowed down the median line, with a small wing-like expansion (obscurely visible without dissection) on each side at the back; labium broadly emarginate in front, ciliate. Thorax wider than long, finely and sparingly punctate, convex in front and down the middle, depressed on the discs, with three or four transverse shallow impressions thereon, and another long, transverse and wrinkled, before the middle; moderately rounded at the sides, the fore angles bent down, the hind prominent and acute; lateral margins slightly sinuous in the middle. Scutellum very small, convex, and strongly transverse. Elytra short, scarcely broader than the thorax at the base, which is sinuous and thickly margined; of a similar shape to the preceding species, but a little more suddenly declivous behind; scarcely depressed at the shoulders, with the humeral angles rounded; nine rows on each elytron of large rounded punctures, arranged as in the preceding species, the intervals quite flat. Metasternum very short; prosternal process obtusely pointed behind. Legs and antennæ rather short; fore and intermediate tibiæ moderately arched. Body beneath, and legs, shining black, with the tarsi, antennæ, and palpi castaneous.

Hab.—Queensland (Port Denison).

4. *Hypaulax oblonga*, n. sp.

Length 11½ lines. Oblong; deep glossy black. Head subquadrate, smooth, exserted; front arcuately depressed at its junction with the epistome, an angulate line faintly impressed on the crown; eyes larger and more distant from the prothorax than in any of the preceding species; labrum very short, broadly truncate anteriorly, separated from the front by a lunate line, with a transverse impression at its base, just within the crown of the arch: mentum as in *H. tarda*, except that the fore angles are rounder, the apical notch less broad and deep, and the median furrow more strongly marked; labium rounded in front, entire, not ciliate: groove on the cheeks short, curved, and terminating in a deep lunate fovea. Thorax longer than wide; broad in front, strongly contracted from behind the middle to the base; sides moderately rounded, with their margins reflexed and obtusely crenulate; front angles rounded, the hind a little produced and pointed; finely punctured; two shallow rounded impressions on the disc at each side the median line (which is distinctly furrowed towards the base), and another near to each hind angle. Scutellum convex, triangular. Elytra elongate, sub-parallel; contracted behind, and rather strongly sinuous towards the apex; shoulders depressed, with the humeral angles strongly in relief; thickly margined at the base, which is closely applied to the thorax; deeply striate, the striæ strongly punctured, the intervals strongly convex at the sides and on the middle, flatter towards the suture. Prosternal process truncate behind. Body beneath, and legs, shining black, with the antennæ, palpi, and tarsi piceous.

Hab.—New South Wales.

I received this insect from Dresden as the *Nyctobates crenata* of Boisduval.

5. *Hypaulax ovalis*, n. sp. (Pl. XII. fig. 1).

Length 10 lines. Deep glossy black. Head moderately prominent, convex, smooth; epistome sinuous anteriorly, separated from the front by an angulate line; eyes more prominent than in any of the preceding; mentum as in *H. tarda;* labium rounded in front, not ciliate; groove on the cheeks as in *H. oblonga*, but broader and deeper.

Thorax very convex and smooth, broadly emarginate in front, scarcely sinuous at the base, strongly rounded at the sides, suddenly contracted behind near the base; lateral margins faintly sinuous, hind angles rather prominent and pointed. Scutellum convex, transverse. Elytra oval, wider than the thorax at the base; punctate-striate, the punctures large and rounded; the intervals subconvex at the sides and on the middle, flat towards the suture; shoulders depressed, with the humeral angles prominent. Prosternal process rounded behind, the intercoxal broadly rounded in front. Legs rather long; fore and intermediate tibiæ rather strongly arched, the hind faintly so. Body beneath, and legs, shining black; antennæ and palpi piceous.

The more than ordinarily rounded and convex thorax, and the oval form of the elytra, give to the present species a facies different from any of the preceding.

Hab.—Queensland (Clarence).

Chileone, n. g.

Characters of *Hypaulax*, but differs in having the head more exserted and narrowed behind; the eyes more distant from the prothorax; the antennæ, relatively, more slender, with joints 3-6 subequal, 8-11 narrower, longer and less depressed; the thorax bisinuate in front, with the angles prominent, the lateral margins more decidedly crenulate, the base distant from the elytra, with its angles free; the thighs more attenuate at the base; the fore tibiæ elongate and strongly curved; the sculpture of the elytra alveolate, etc.; characters which, taken altogether, give to the genus a different facies to that of the preceding.

Chilcone Deyrollii, n. sp. (Pl. XII. fig. 2).

Length $9\frac{3}{4}$ lines. Elongate, bluish-black, with the head and prothorax opaque. Head convex; epistome subsinuate anteriorly; separated from the front by a semicircular impression; mentum broad, notched in the middle anteriorly, front angles rounded, narrowed to the base, not furrowed down the median line; labium broadly emarginate in front, not ciliate; the groove

on each cheek enormously developed, and nearly meeting in the centre of the head beneath. Prothorax but little convex, minutely and sparingly punctate,* a transverse impression on each side the median line near the base; strongly bisinuate in front, with the fore-angles prominent but rounded; sides moderately rounded, suddenly and obliquely contracted from beyond the middle to the posterior angles, which are small and pointed; sinuous at the base, which, with the sides, are margined, the latter reflexed, and decidedly crenulate. Scutellum angulate behind. Elytra a little broader than the base of the thorax; gradually widening to beyond the middle, then strongly contracted and sinuous to the apex; declivous behind, very thickly margined at the base; shoulders depressed, the humeral angles rather strongly in relief; alveolate, more decided so on the sides and on the middle, with three round punctures ranged on each side the scutellum. Prosternal process strongly bisulcate, obtusely rounded behind; the intercoxal wide, and broadly rounded at the apex. Legs rather long and slender; all the tibiæ curved, the fore tibiæ as strongly so as in some species of *Nyctobates*. Body beneath, legs, etc., shining black.

Hab.—Queensland (Clarence).

Dedicated to M. Henri Deyrolle, from whom I received the species.

Sub.-fam. TENEBRIONINÆ.

Gen. Dechius.

Pascoe, Journ. of Entom. ii. 455.

The author of this genus gives as characters "*labro obtecto*," and "*maxillæ lobo interno mutico*;" for the first of these, I cannot see that the labrum is more hidden than in the majority of the species of *Tenebrio*; and for the second, there certainly does exist a small terminal claw, or hook, to the inner lobe of the maxillæ. But the chief distinguishing character of the genus appears to have been overlooked, namely, *the epipleural fold of the elytra incomplete behind*; in this respect assimilating it to the genus *Bius*.

* Under the microscope, the whole surface of the head and prothorax appears very finely and minutely reticulate, and thickly sprinkled with minute polished granules.

Dechius scissicollis, n. sp.

Length 3¾ lines. Deep black, shining. Head sparingly punctured. Prothorax glossy, nearly impunctate on the disc, a few scattered punctures on the sides and down by the median line, the latter marked by a deep crenate groove, expanding behind (and within the margin) into a broad triangular notch; grooved along the base, the raised margin bordering this groove angularly notched in the middle, this notch and the one previously mentioned opposed to each other, so that, in the middle of the base, there appears a deep somewhat lozenge-shaped depression: hind angles nearly right angles. Scutellum pentagonal. Elytra but little broader than the prothorax at the base; convex, subcylindrical; rather strongly striate, the striæ punctured; the punctures not approximate; the margins (especially at the base) rather broad, reflexed, and (as also at the extremity) subsinuous. Body beneath, chesnut-red, shining; underside of prothorax, legs, and terminal joints of the abdomen, piceous; tarsi and oral organs red; antennæ reddish-brown. The tibiæ are very curiously sculptured, the whole surface being covered with a network of fine raised sinuous lines, enclosing small, oval, rounded, or angulate cells or spaces, more strongly marked on the underside.

In the ♂ (?) the hind tibiæ are expanded and thickened towards their extremity, with a dense fringe of yellow hairs on their inner side, extending to one-third their length from the apex.

Hab.—New South Wales.

I have received this insect from Paris as a species of *Hylobates* (Dej. Cat.).

Sub.-fam. HELOPINÆ.

Dædrosis, n. g.

Mentum subcordiform; wider than long; unequally convex; rather broadly emarginate anteriorly; *labium* rather prominent, arcuately notched in front, last joint of its palpi somewhat elongate, subcylindrical, the apex truncate; inner lobe of the *maxillæ* unarmed; furnished with a brush of long bristly hairs at the summit within,

last joint of the palpi rather broadly securiform; *mandibles* fissile at their extremity. *Head* rugged, sloping from the vertex forward; slightly contracted behind the eyes, flattened or irregularly depressed above; *epistome* gradually narrowing to the front, which is arcuately emarginate, the angles scarcely rounded; transversely convex or thickened posteriorly, and separated from the front by a sinuous furrow, from which start two obscurely defined lateral ridges, directed behind; *labrum* transverse, rounded at the sides, and arcuately notched in front; *eyes* transverse, gradually contracted inferiorly by the cheeks, the superior portion sub-prominent. *Antennæ* rather robust; sub-perfoliate, finely setulose; second joint very short, third a little longer than the following, obconic; four to seven subequal, sub-obconic; eight to ten gradually broader, subglobose, pubescent; eleventh much larger, elongate-ovate, and densely clothed with a very short, fine, decumbent pubescence. *Prothorax* not contiguous to the elytra; subquadrate; but little convex; slightly emarginate in front, subsinuous at the base, which is very finely margined to about one-fourth its width on each side, the angles small but distinct; but slightly rounded at the sides, which are finely margined and obtusely crenulate. *Scutellum* small, triangular, placed on the scutum of the mesothorax. *Elytra* oblong; but little broader than the thorax at the base; subparallel, or very gradually widened to beyond the middle, then contracted to the apex; the lateral margins becoming broader and more reflexed as they approach the extremity; humeral angles prominent, somewhat reflexed, formed by an expansion of the epipleural fold;* the latter entire, sinuous before the middle, but not at the extremity. *Mesosternum* sloping, more or less concave in front; *metasternum* short; *intercoxal process* rather narrow and more or less rounded anteriorly; the prosternal curved inwards, finely bisulcate or margined. *Legs* moderate, somewhat robust; thighs of the anterior pair subclaviform, the posterior rather strongly compressed; fore and intermediate tibiæ straight, the hind subsinuous or not; the apical half of all rather densely clothed within with longish hairs; moderately spurred; *tarsi* clothed beneath with long hairs; the penultimate joint of all entire, the first joint of the posterior shorter than the last. *Body* elongate, wingless; *abdomen* without pubescence.

* "Répli épipleural" of Lacordaire.

This genus belongs to Lacordaire's second division or "groupe" of the sub-family, which has for types the Australian genera *Thoracophorus* and *Adelium*. As the group at present stands, *Dædrosis* would appear to approach most nearly to *Thoracophorus*, although it has many points which ally it to the European genus *Læna;* indeed, were the humeral angles wanting, the prothorax more rounded at the sides, with its margins simple, it would have quite a similar *facies* to the last-named genus. The intercoxal process is, relatively, much narrower than in any other member of the group. The comparative length of the first and last joints of the posterior tarsi does not appear to be a character possessing any *generic* value. In *Thoracophorus* the first joint is longer, equal to, or shorter than the last, according to the species, and even, I believe, according to the sex: and in the species of *Læna* observed by me, the same variability obtains.

1. *Dædrosis crenato-striata*, n. sp.

Length 5 lines. Subcylindrical; of a deep glossy black, with the elytra bronzed-black. Labrum punctured; head and prothorax very coarsely and deeply punctured, the interstitial spaces irregularly convex and confluent; the former with a transverse ridge on the crown, and another in front of the eyes, the spaces between these and the epistome irregularly flattened or depressed. Prothorax very glossy, convex in the middle at the anterior margin, a little longer than broad, slightly contracted from behind the middle to the base, hind angles small, but distinct; scutum of the mesothorax strongly punctured. Scutellum glabrous. Elytra elongate, deeply crenate-striate, the interstices (except at the suture) convex, transversely rugulose, with a few small scattered punctures. Flanks of the prothorax, episterna, and base of the epipleural fold very coarsely and deeply punctured; the abdomen much less strongly and more sparingly so; a few long setose hairs placed irregularly on the head, prothorax, elytra, sterna, thighs, and on the last joint of the abdomen. Hind tibiæ subsinuous; intercoxal process rather narrow, gradually contracted to the apex, which is rounded; first abdominal joint with a depression on each side at the base of the intercoxal process, which gives to

the latter the appearance of being compressed. Body beneath, shining black; legs pitchy-black, with the tarsi, labrum, and palpi castaneous.

Hab.—New South Wales.

2. *Dædrosis ambigua*, n. sp. (Pl. XII. fig. 3).

Length 5½ lines. Differs from the preceding in the following particulars:—Of a deep glossy black, with the elytra concolorous; head with a large, irregular pentagonal depression above, its apex directed towards the vertex; thorax relatively broader, shorter, and more square, less contracted behind, the lateral margins more strongly crenulate; scutellum larger, of a deeper and glossier black; elytra relatively broader, more expanded behind the middle; the interstices plain, not transversely rugulose; hind tibiæ straight; mesosternum more declivous, and more concave in front; the intercoxal process more broadly rounded anteriorly: the abdomen of a deeper and glossier black, more sparingly punctured, the first joint plain, not foveate; legs deep glossy black, with the tarsi, labrum, and palpi castaneous.

Hab.—New South Wales.

It is probable that this may ultimately prove to be but the female of the preceding. I have seen but one example of each, and the specimen of *D. crenato-striata* wants the anterior tarsi. I have thought it best, however, at present, to keep them distinct.

Fam. CISTELIDÆ.

Gen. Othelecta.

Pascoe, Journ. of Entom. ii. 488.

Othelecta vestita, n. sp.

♀. Length 5½ lines. Dark brown, shining; clothed with decumbent, cinereous, spinose hairs (apparently somewhat abraded in the specimen before me). Head (save a line down the centre) and prothorax closely and evenly covered with small rounded impressions, having a somewhat cellulose appearance; the latter convex, subquadrate. Scutellum not convex, somewhat pointed behind; a few large shallow impressions in front. Elytra

convex, regularly ob-ovate, the surface finely asperous with minute obliquely-hollowed tubercles, from which arise the spinose hairs with which the surface is more or less invested, and a few similar, but much larger, dispersed tubercles, from each of which starts a long, black, erect, setose hair. Body beneath, and legs, dark brown, shining; closely and coarsely punctured (save the abdomen, which is much more finely and sparingly so), and clothed, like the upper surface, with long, decumbent, cinereous, spinose hairs, those on the legs being finer and pale griseous; claws of the tarsi stoutly and bluntly denticulate, the denticulations five in number on each branch.

Hab.—South Africa.

This insect came to me labelled "*Imatismus vestitus*, E. Z.," but upon what authority I know not.

Alcmeonis, n. g.

Very near to *Atractus*,* from which it differs in having the form more depressed; the last joint of all the palpi shorter and broader with the second of the maxillary a little longer and more slender; the thorax broader behind, with the base subsinuous; the scutellum shorter and more broadly rounded posteriorly; the intercoxal process subtriangular, and subacuminate at the apex; the legs (especially the posterior pair) much shorter and more slender; the claws of the tarsi less robust and more finely pectinate.

Although the characters of this and the two following proposed new genera may be considered slight, they are combined with a *facies* different from that of *Atractus*; and, taken together, may, I think, constitute proper genera. The genera belonging to this section of the family *Cistelidæ*, which has for its chief character the mandibles elongate and entire at their extremity, although offering a great diversity in *habit*, do not always present very marked distinguishing characters.

I know only the female of this genus.

* Lacordaire, Genera des Coléop. v. 497. This name being already in use, Mr. Pascoe (Journ. of Entom. ii. 23, note) has proposed *Ethyssius* to replace it. See Pl. XII. fig. 7, antennæ and palpi of *Atractus*.

Alcmeonis pulchra, n. sp. (Pl. XII. fig. 4).

♀. Length 5 lines. Head and thorax castaneous; elytra green, with purple reflections: shining, clothed with a silky golden pubescence. Head coarsely punctured. Thorax depressed, longer than broad, moderately punctured, the sides subparallel or very gradually widening to the base, which is subsinuous, faintly impressed down the median line; a large round shallow impression at the middle of the base, within the margin, and another, oblique, on each side, completely marginal; an angulate patch at the base, and a line down the centre, black. Scutellum black. Elytra depressed along the suture and on the discs, truncate at the base, which is rather more than half as wide again as the prothorax; broadest behind the middle, thence contracted to the apex; crenate-striate, the interstices moderately convex, sparingly punctured, and transversely wrinkled. Body beneath, deep shining black, pubescent; legs, palpi, and three first joints of the antennæ clear red, remaining joints of the latter black.

Hab.—South Australia (Adelaide).

Licymnius, n. g.

Also very closely allied to *Atractus*. It differs from that genus in the following particulars:—Last joint of the labial palpi more briefly and broadly triangular; the second of the maxillary longer and more slender, the last shorter and more broadly cultriform; the foliaceous appendage at the inner side of the base of the mandibles smaller, shorter, less regularly falciform; antennæ* subcompressed: joint 1, less swollen; 3, relatively shorter; 10, longer and narrower, *the last much shorter, scarcely half the length of the* 10*th, subovoid;* head broader, less produced in front; thorax wider, squarer, depressed, the base subsinuous; scutellum angulate behind; elytra flatter, gradually tapering from the shoulders to the apex, the epipleuræ continued nearer to the extremity; legs—especially the posterior pair—much shorter, less robust;

* Starting from the apical half of the third joint, the whole surface of the antennæ, under the microscope, appears rugged with approximate punctures and rugosities, a feature which is not repeated in any of the allied genera.

posterior coxæ more swollen within, and more approximate (probably a sexual character only); the intercoxal process narrowly triangular, and acuminate at the apex.*

There are six joints to the abdomen in the male, the only sex known to me. Further to distinguish this genus from *Atractus*, I may add, that the posterior femora in the male are simple (not toothed in the middle), and the tibiæ of the same pair are rounded (not expanded nor keeled externally).

The square prothorax, and the remarkably small terminal joint of the antennæ, will readily distinguish this genus from the preceding.

Licymnius foveicollis, n. sp. (Pl. XII. fig. 5).

♂. Length 4¼ lines. Black, shining, sparingly pubescent. Head coarsely and rugosely punctured. Thorax glossy, subquadrate, scarcely longer than broad, somewhat densely and coarsely punctured; a rounded shallow impression at the middle of the base, within the margin. Scutellum subpentagonal. Elytra scarcely twice the width of the prothorax at the base, depressed, gradually tapering from the shoulders to the extremity; striate, the striæ irregularly crenate, the interstices almost flat, punctured, and more or less transversely wrinkled; an elongate patch, starting from the shoulder and extending obliquely to the disc, fulvous. Body beneath, shining black, sparingly pubescent; legs and palpi shining black, with the base of all the thighs, and the middle of the posterior shanks, yellow. Antennæ dull black.

Hab.—Queensland (Brisbane).

Anaxo, n. g.

In its larger, broader, and still more depressed form, this genus differs from any of the preceding. With a similarly shaped prothorax, and the short terminal joint of the antennæ, as in *Licymnius*, it differs in having the second joint of the maxillary palpi shorter and more

* I do not know the genus *Chromomœa*, Pascoe, (Journ. of Entom. ii. 490.) It would seem to approach very closely to *Licymnius*, but, as he does not particularize the terminal joint of the antennæ, and gives the prothorax of the same form as in *Atractus* (which is decidedly oblong), I must consider them distinct.

robust (as in *Atractus*); the antennæ relatively shorter and more compressed, with the ninth joint truncate, and somewhat produced at the apex within; the tenth and eleventh of a similar form, but more slender; head more robust, broader between, and less contracted behind, the eyes; the latter more depressed; thorax truncate at the base; scutellum broader and somewhat rounded behind; elytra flatter, the sides sub-parallel; intercoxal process gradually arched to the apex, which is subacuminate, its base depressed below the plane of the abdomen.

I know only the female.

Anaxo brevicornis, n. sp. (Pl. XII. fig. 6).

♀. Length 6 lines. Black, shining; sparingly pubescent. Head closely and coarsely punctured, the thorax more finely and sparingly so; the latter subquadrate, scarcely longer than wide; a profound, conically-shaped depression at the middle of the base, extending across the margin. Scutellum large, sub-transverse. Elytra scarcely twice the width of the thorax at the base, strongly depressed; sides subparallel for three-fourths of their length, then contracted to the apex; striate, the striæ irregularly punctured, the interstices nearly flat, coarsely punctured, and somewhat strongly and transversely wrinkled. Body beneath, shining black, very sparingly pubescent; legs fulvous, with the apical half of the thighs, the tips of the tibiæ, the tarsi, antennæ, &c., black.

Hab.—South Australia (Adelaide).

Explanation of Plate XII.

Fig. 1. *Hypaulax ovalis.*
2. *Chileone Deyrollii.*
3. *Dædrosis ambigua.*
4. *Alcmeonis pulchra.*
5. *Licymnius foveicollis.*
6. *Anaxo brevicornis.*
7. Antennæ and palpi of *Atractus.*

XIII. *On the Larva of* Micropeplus Staphylinoides.

By Sir John Lubbock, Bart., F.R.S., V.P.L.S., V.P. and late Pres. Ent. Soc.

[Read 6th July, 1868.]

Whilst looking for Thysanura I have several times, though not often, met with the curious little Coleopterous larva, which is figured in the accompanying plate (Plate XIII.)

As it appeared to differ from any larva of which I could find a description, I endeavoured to breed it, and at the commencement of March, a specimen, which I had found in January, came to maturity, and turned out to be a *Micropeplus*. The true position of this genus being a matter of some doubt, and the larva therefore of considerable interest, I forwarded the specimen to my friend Mr. Janson, in order that I might be sure about the species, and he has favoured me with the following letter.

"The little beetle pertains to the genus *Micropeplus* of Latreille, and is I believe the *M. Staphylinoides* of Marsham (*Nitidula Staphylinoides*, Marsh. Ent. Brit. 137). The earlier stages of *Micropeplus* appear to be entirely unknown. Prior to Erichson, great diversity of opinion existed as to its affinities, some authors referring it to the *Nitidulidæ*, and others to the *Brachelytra*. Erichson, however, located it in his eleventh group, *Proteinini*, of the *Staphylinini*, remarking (Gen. et Spec. Staph. 911) 'Corporis habitus singularis, sculptura singulari, præterea antennis capitulatis, receptis, et pedibus intermediis late distantibus; insigne hoc genus, a multis auctoribus perparum *Nitidulis* adscriptum,' and I believe all subsequent systematic writers have accepted his views. Lacordaire (Genera des Coléop. ii. 150) observes, 'Genre ambigu, tenant manifestement par son *facies* et ses antennes aux Nitidulaires, parmi lesquels Herbst, Latreille, Dejean, etc., l'ont placé; mais ses organes buccaux, construits exactement sur le même plan que ceux des *Omalides*, démontrent qu'il appartient à la famille actuelle [*Staphyliniens*] comme l'ont pensé la majorité des entomologistes dépuis Fabricius inclusivement jusqu' à Erichson.' Under these circumstances, a knowledge of the earlier state of your little beetle would be especially valuable."

Unfortunately, we are acquainted with very few larvæ either of the *Nitidulidæ* or of the *Brachelytra*. Messrs. Chapuis & Candèze, in their learned memoir on the larvæ of *Coleoptera*,* mention only three species in the whole family *Nitidulidæ*, the larvæ of which are known to us. Of these, one, that of *Epurea obsoleta*, is described by Bouché,† but so shortly, that they do not think it worth while to quote it; the second, *Pocadius ferrugineus*, is also described by Bouché,‡ but there is some doubt about the identification. Consequently the larva of *Nitidula grisea* is the only one which can really be said to be known to us.

Nor is our knowledge of the Brachelytrous larvæ much more complete. Out of the whole number, less than twenty are as yet known, so that Messrs. Chapuis and Candèze say, 'le nombre des larves de cette grande famille decrites jusqu'à ce jour est très peu de chose, ce qui s'explique en partie par la difficulté qu'il y a à se les procurer, et surtout à les conserver vivantes jusqu' à leur entier developpement." ||

Under these circumstances it would not be safe to rely too much on the characters afforded by the larva of *Micropeplus*. Nevertheless the larvæ of the *Brachelytra* hitherto known are active, elongate, and provided with two bi-articulate, mobile, anal appendages. They differ therefore considerably from our larva, which is oval, sluggish, and without the anal appendages. So far therefore, the larval characters would seem to tell in favour of those who place *Micropeplus* among the *Nitidulidæ*, rather than among the *Brachelytra*.

I have found it on the under-side of dead boughs. The colour is light brown, the length about one-fifteenth of an inch. The general outline of the body is oval. The skin is granular. The lateral margins of the segments are produced, and each bears at its extremity a curious leaflike yellowish process. The posterior margin of each segment is also armed with a row of thick spines, decreasing in size towards the middle line; these spines are, with the exception of the outer ones, armed with lateral

* Mémoires de la Société Royale des Sciences de Liège, 1853, vol. viii. p. 347.

† Naturg. der Insect. 1834, p. 188.

‡ Ibid.

|| Mém. Soc. Roy. Sci. Liège, viii. 395.

teeth. The margins of the three first segments after the head are bifurcate. The anterior fork of the first bears a stout seta, the posterior one, as well as both processes of the two following segments, bear foliated appendages like those of the abdominal segments.

The lateral expansions of the middle segments stand out at right angles to the longer axis of the body, but they gradually turn round, so that those of the terminal segment point backwards, only diverging a little from one another. Besides the foliated appendage, this segment bears at each extremity, a stout, rodlike, not very long seta.

The accompanying figure (Plate XIII) obviates the necessity for any detailed description.

The antennæ are four-jointed, short and tapering. The third segment, counting from the base, bears three small hairs, and a strong slightly-curved process, which is somewhat longer than the apical segment. The terminal segment bears a tuft of hairs, and a strong spine at the apex, and a hair at each side near the middle. None of the hairs on this segment taper to a point, but all end somewhat abruptly.

The legs are short, and all six similar to one another. The claw is simple but strong. The segment preceding it is slightly conical, and bears several curious pairs of spines, or rather perhaps bifurcate spines, as well as a few hairs.

There are no anal styles.

Explanation of Plate XIII.

Fig. 1. Larva of *Micropeplus Staphylinoides*, × 56.
2. Antenna ,, ,, × 250.
3. Hind foot ,, ,, ,,
4. Fan-shaped process ,, ,,
5. ,, ,, ,, ,,
6. Rodlike hair ,, ,, ,,
7. Curved hair ,, ,, ,,

XIV. *On some points in the Anatomy of the immature* Cænis macrura *of* Stephens. By A. E. Eaton, B.A.

[Read 6th July, 1868.]

The following observations are intended merely as a supplement to the researches of other anatomists, and do not touch upon any details in the organization of *Cænis*, besides those which have been the subjects of their studies in other genera of the *Ephemeridæ*; neither do I purpose reiterating the lines of investigation pursued by them in connection with this particular genus.

In the mature *Egg*, the germinal matter is segregated at one end in such a way as to assume the appearance of a somewhat lunate protuberance from it.* One might liken its outline to that of the seed of the horse-bean, with the expansion of the funiculus attached to it. This seemingly appendant condition of the germinal matter is not peculiar to this genus. In *Ephemerella*, Walsh, the mass in question constitutes nearly two-fifths of the egg, from the rest of which it is marked out by a slight constriction; but its form differs from that of the corresponding part in *Cænis*, in being sub-conical, instead of crescent-shaped. Mr. Haliday, also, represents the mature egg of *Phlœothrips pini*, Hal., with a small appendix at one end (Walk. Brit. Mus. Cat. Homoptera, part iv. pl. viii. fig. 15).

During its later *subaqueous stages of development* (which I have recently discovered) *Cænis* resides in the beds of rivers and streamlets, either near the surface of mud-banks, or under stones, according to the nature of the bottom. When it is dropped into water, it presently begins to swim slowly, remarkably slowly for an Ephemerid, by means of the vertical movements of the body usual in these insects, aided by feeble strokes with its sprawling legs.

The body is more than ordinarily pubescent; in some parts it is even hirsute. The *head*, in what I regard as the immature *C. halterata*, Fab., is armed with three rather short, obtuse, conical spines in the place of the ocelli; but in the type it is unarmed. The inner two divisions of the *labium* are obtusely ovate; the outer two are narrower, and somewhat curved: they are

* Compare with this the yolk of an Osseous Fish's egg,—say *Gasterosteus*, as represented in Journ. Anat. & Physiol. vol. I. pl. xi. 1. g. c.

all of them covered with pubescence. The tri-articulate labial palpi* are covered with a long pubescence, excepting at their joinings. Their flattened, robust, basal joints are as long as the other two together, or nearly so; and their acute apical joints are equal in length to about one-half of the second joints. The *maxillæ* are slightly curved and compressed, toothless and acute, and somewhat hispid along their concave inner edges. The maxillary palpus arises from a slight depression in the middle of the exterior surface of the maxilla, to which it is equal in length. The first of its four joints is very short, the second is as long as, but rather broader than, the fourth, and is slightly longer than the third joint. The fourth joint is hirsute at the tip, but the palpus is otherwise only sparingly pubescent. Externally the somewhat triquetrous *mandibles* are ciliate. The internal prominent process of each is slightly bevelled, and finely denticulate along its anterior edge towards its pointed apex, and is furnished with a small tubercle near the middle of its inner longitudinal edge. The outer tip of the mandible ends in two stout prorect spines, and a more slender obliquely curved spine: the remaining part of the anterior edge is erose. The transverse *labrum* is ciliate, and slightly retuse. The bilamellar *tongue* consists of an emarginate thickened glabrous upper portion, bent upon an inferior bipartite ciliate plate, whose divisions are obovate and remote. At the joinings of the otherwise naked *antennæ* are verticils of scanty spreading hairs; the second joints of these organs are three times as long as the first.

The *prothorax* is transverse, as broad as the head, but rather narrower than the mesothorax. In the typical species the pubescent legs have compressed femora, and the oblique tips of the tibiæ are produced each into a short spine; *C. halterata* differs from the type in having uncompressed femora, and ciliate tibiæ and tarsi.

The first six and the last two *abdominal segments* are short—about one-third shorter than the remaining ones; the sides of the segments intervening between the first and the last two, are flattened out, and their postero-lateral angles are considerably produced, and ciliate; the last three abdominal joinings are clothed with stiff erect hairs. The arrangement and condition of the *branchial plates* is very peculiar. The first pair arise from the

* Prof. Westwood regards these as a second pair of maxillæ, and maxillary palpi.

antero-lateral angles of the foremost segment; they are erect, two-jointed (?.), subulate, acuminate, and have long fringes. From their position, their minuteness, and the dirtiness of the animal, they are liable to be passed over; or they might be mistaken for rudimentary hind-wings. The second segment is ebranchiate, and its upper posterior margin is slightly produced, especially in the middle. The next five segments bear pairs of single branchial plates. The first pair is disproportionally large, and formed of obtusely oval incrassated lamellæ, which are truncate anteriorly, ciliate at the sides and tip, and conceal the other four completely. The left plate slightly overlaps the other, its truncate edge is applied to the second joining, fitting under the produced edge of the second joint, which keeps it steady during the act of respiration. Each of them is traversed by a longitudinal lambda-shaped crease whose prongs meet the anterior edge, and on the underside is membranaceous and permeated by a trachea, which runs at first obliquely inwards, and then lengthwise, giving off several rather straight branches in a dendroid manner. The remaining plates are very different from the first, being delicately membranous, semiovate, and deeply fringed. The trachea divides almost at the base of the gill into about six fastigate, only slightly divided, branches, whose branchlets, without undergoing much diminution of calibre, run up each of them into one of the filiformly dissected fringe-processes. The gills are successively smaller backwards, each in its turn is extensively covered by its immediate predecessor, and the contiguous fringes of adjacent lamellæ are interlaced with one another in repose. In the action of breathing, the protecting plates are raised slightly, and remain motionless, whilst the other pairs are briskly agitated forwards and backwards. The intrusion of mud between them is effectually guarded against by the before-mentioned cilia and fringes. The tenth segment bears the caudal setæ, which have spreading hairs inserted upon their joinings in two opposite rows. The ventral ganglionic chord, and the alimentary canal, offer no extraordinary peculiarities.

Dimensions:—body 6·5; setæ, med. 3·8, ext. 4. millim.

Although foreign to the title of the paper, I may mention that the adult insect holds its wings horizontally extended in repose, seldom erecting them; and also that the forceps of *C. halterata*, Fab., are apparently jointless,

whereas those of the typical species (if they are not mucronate) seem to be bi-articulate.

To conclude, it will be seen that, in its preparatory states, *Cœnis* differs considerably from other *Ephemeridæ* in their corresponding stages of development, so far at least as we are at present acquainted with them. But at the same time, it sufficiently resembles the young of *Ephemera* and *Palingenia*, in those points wherein it differs from *Baëtis*, Leach (*Cloë*, Burm., Pict. p.) to authorise the opinion of those who associate it with the former two genera rather than with the last. In *Baëtis*, although the wings of the adult insect are not very unlike those of *Cœnis*, the labium and its palpi are very differently constructed, the branchial lamellæ are entire, and in its subaqueous stages the insect climbs the water weeds, or runs over the surface of the bottom, and swims with a quick dashing motion. These peculiarities of *Baëtis* contrast with the burrowing habits, the production of the edges of the respiratory plates into fringing processes which contain subdivisions of the branchial tracheæ, etc., of *Cœnis*,—particulars wherein it is approximated to *Palingenia* and *Ephemera*. With these two genera, *Cœnis* is moreover connected by *Oligoneuria*, Pict., which approaches, in its adult condition, *Polymitarcys* and *Campsurus* (genera which I have dismembered from *Palingenia*, Burm., Pict., typified respectively by *P. virgo*, Ol., and *C. latipennis*, Walk.), as may be shown by a comparison of their heads, forceps, and other organs, and the duration of their subimago states. On the other hand, *Cœnis* is also related to *Leptophlebia*, Westw., and *Ephemerella*, Walsh. Thus a great similarity exists between its labium, labial palpi, legs, and abdominal segments, and the corresponding parts of the last-named genus, to whose gills the protecting gills of *Cœnis* admit a tolerably close comparison. Further, the branchial lamellæ of *Leptophlebia*, and its forceps, are constructed much in the same way as the membranous gills of *Cœnis*, and the forceps of *Oligoneuria*. Seeing, then, that *Leptophlebia* and *Ephemerella* are in some degree connected with *Ephemera* by *Potamanthus*, (restricted, type *P. luteus*, L., Pict.), and that they are also related to *Cœnis* and *Oligoneuria*, and that these in their turn are allied to *Campsurus* and *Polymitarcys*, I am inclined to consider *Cœnis* and *Oligoneuria* collateral with the group of genera to which *Ephemera* and *Campsurus* belong.

XV. *Observations on some South-African Butterflies enumerated in the "Catalogue of Diurnal* Lepidoptera *of the Family* Satyridæ *in the Collection of the British Museum.* By Arthur Gardiner Butler, F.L.S., F.Z.S., &c., London; 1868." By Roland Trimen.

[Read 2nd November, 1868.]

Having received, through the liberality of the Trustees, a copy of the British Museum Catalogue of *Satyridæ* lately published, I wish to offer a few remarks respecting some of the South-African species included in that volume.

My remarks relate to the genera—
Leptoneura,
Pseudonympha,
Neope,
Mycalesis, and
Yphthima.

Leptoneura cassina, Butler, sp. nov.

(Cat. Satyr. p. 72, pl. ii. fig. 12.)

Closely allied as this form is to the typical *Cassus,* Linn., I am disposed to think that Mr. Butler is right in treating it as distinct. It appears, as far as I have been able to observe, to frequent quite a different locality from that inhabited by the type-form, and never to mix with the latter. I have described the form now named *Cassina* in the following terms (Rhop. Afr. Aust., ii. p. 196):—"Specimens found on the sandy flats are invariably much smaller and darker than those inhabiting the hills, the markings of some males being all but obliterated, so that the surface is almost unicolorous. The ochreous colouring of the underside, too, is wanting in the lowland examples, being represented by irregular grayish scaling, conspicuous on the dark ground."

Pseudonympha Sabacus. (p. 93).

Erebia Sabacus, Trimen, Rhop. Afr. Aust., ii. p. 200, pl. 4, f. 1.

Pseudonympha Trimenii, Butler, sp. nov. (p. 94).

Erebia Sabacus, var. A, Trimen, *lib. cit.*, p. 201, pl. 4, f. 2.

Mr. Butler, after stating his inability to regard these two forms as one species, observes (p. 93):—"The position of the ocelli is quite different in the white-veined form," [i. e. *Trimenii*]; "and the central strigæ, which appear to constitute the most constant character in the present family, are different in outline." These remarks apply to the under-surface of the hind-wings, and are correct as regards the central transverse streak, which seems always to be much less angulated than in the type *Sabacus;* but I find the *number*, rather than the "position" of the ocelli different,—the form *Trimenii* constantly presenting six, instead of the smaller number (never exceeding five) found in *Sabacus* proper.

As noted in my work (ii. pp. 201, and 202 *foot-note*), *Sabacus* is a very variable and widely-spread species, especially as regards the clouding and ocelli of the underside of the hind-wings, some examples from the Eastern parts of South Africa having white nervures without the other peculiarities of the form *Trimenii;** and I was therefore inclined to regard the solitary specimen of the latter figured in my book, as an unusual variety or aberration rather than a distinct species. Since that example was figured, however, I have met with the same form, not uncommonly, in three distinct

* I have just seen (Sept. 18th) two specimens, lately added to the collection of the South African Museum, which were taken by Mr. J. H. Bowker (I believe in British Kaffraria), and which form a further link between the form *Trimenii* and *Sabacus* proper. These examples present distinctly whitish veining as in *Trimenii*, and the central streak is strongly marked and angulated, while the ocelli are reduced to six black spots, without pupils or external rings; and on the underside of the *fore-wings* the red is paler and wider, and (as in *Sabacus* proper) the crossing streak from costa is all but obliterated. On the *upperside*, the ocellus of *fore-wing* is enlarged, and the basal portion of the red field almost obsolete; while the red of the *hind-wings* is enlarged, and the six ocelli unusually apparent. Both examples are larger than the ordinary *Trimenii*, and all the markings are singularly dark and suffused, the pupils of the forewing ocellus being bluish.

localities, two being at a considerable elevation, while the third was probably not 200 feet above the sea-level. On the mountains, there appeared to be no examples of the type *Sabacus* in the vicinity, but in the lowland station the latter was literally swarming, a small proportion only being of the form *Trimenii*, and those flying among the crowd, and not to be distinguished on the wing. The latter instance rather shook my growing belief in the distinctness of "Var. A" as a species; but I hope to have further opportunities of investigating the question.

Neope dendrophilus. (p. 113).

Debis dendrophilus, Trimen, Rhop. Afr. Aust. ii. p. 191, pl. 3, f. 8.

Mr. Butler observes, "I have seen specimens of this species in Mr. Hewitson's Collection. It evidently belongs to the genus *Neope*." On referring to Mr. Butler's definition of this genus ("Ann. and Mag. Nat. Hist." March, 1867), I find him stating as follows, viz.:—"The species composing this genus seem very closely allied to some of the species of *Debis;* and I almost question the propriety of separating them from that genus." If *Neope Moorei*, Butler, a figure of which accompanies the paper in question (pl. iv, f. 7) be a fair representative of the new genus, it is certainly doubtful whether *dendrophilus* can be regarded as a true congener of that species, for my insect has considerably shorter antennæ, much blunter fore-wings (rather truncate than apically produced), and hind-wings less prolonged in their lower portion.

During the early part of the year 1867, I discovered, in the Colony of Natal, a very beautiful and striking variety of *Dendrophilus*, in which *all the spots of the fore-wings are enlarged and pure white*, instead of those of the outer row only being whitish and those of the inner ochreous. This form was numerous in elevated woods at Tunjumbili, overlooking the Tugela valley. Specimens are in Mr. Hewitson's collection.

Mycalesis Eusirus. (p. 128).

Mycalesis Eusirus, Hopffer, Monatsberichte d. Königl. Akad. d. Wissensch. zu Berlin, 1855, p. 641.

Mycalesis Evenus. (p. 129).

Mÿcalesis Evenus, Hopffer, *loc. cit.*

Mycalesis Caffra. (p. 129).

Mycalesis Caffra, Wallengren, Lep. Rhop. Caffr., p. 34, n. 2 (♀).

In my work on South African Butterflies, I have given these three, together with *Mycalesis Gambius*, Doubleday, and *M. injusta*, Wallengren, as one species, regarding *Eusirus* and *Caffra* as specifically identical with *Evenus*. Under *M. Eusirus*, Mr. Butler writes thus (p. 129):—"Mr. Trimen, having received a single specimen of the variety *injusta*, has considered himself fully justified in sinking the species *Eusirus*, which he places as a synonym of the more recent *Evenus; injusta* does not, however, link these species, nor do any connecting forms appear to exist." As I think this gives an incorrect idea of what I have published, I proceed to transcribe the passage (*Rhop. Afr. Aust.*, ii. p. 208):—"There can be no doubt that Hopffer's *Eusirus* is nothing more than a strongly-marked example of the ♂ *Evenus*. Such was my decided impression on merely comparing the excellent figures in Peters' "Reise;" and a specimen of the variety since received from Kaffraria entirely confirms it. Variability in the size and number of the ocelli is a character common to the greater part of the *Satyridæ*, and *Mycalesis* is no exception to the rule. In the specimen referred to, there is a further very minute ocellus close to the termination of the pale streak. Wallengren's *M. injusta* appears to be this variety, especially as he notes its resemblance to Cramer's *Justina*, to which it certainly seems very nearly allied. Cramer's figure, however, gives *two* ziczac lines beneath, between ocelli and the line parallel to hind-margin, and depicts no striæ in discoidal cell. He states the species to inhabit Coromandel. *M. Caffra*, Wlgr., is very clearly a pale ♀ of *Evenus*, only varying as regards the number and distinctness of the ocelli."

I would here observe (1) that, in my second sentence above quoted, the words "the variety" mean *Eusirus* (not *injusta*)—the form just before referred to as, in my opinion, "a strongly-marked example of the ♂ *Evenus*," —and that I subsequently remark that "*M. injusta* appears to be this variety"—*i. e.* the same variety as *Eusirus*, of which I had received a Kaffrarian example; —(2) that *Evenus* can scarcely with justice be termed a "more recent" species than *Eusirus*, seeing that both forms were originally described together, by Hopffer, on the same page of the Journal above mentioned; and (3) that I never expressed the opinion that Wallengren's *injusta* "linked" *Evenus* and *Eusirus*, but that it was the same as, or synonymous with, the latter.

Mr. Butler, however, gives (p. 129) *M. injusta* as a "Var. ♂" of *M. Evenus*, a view in which I quite concur, the only difference on this point being that I go rather further, and, from a comparison of Wallengren's and Hopffer's descriptions with the latter's figures, hold *injusta* and *Eusirus* as in all probability one and the same form.

I would only further remark that, whereas Wallengren distinctly indicates (Lep. Rhop. Caffr. p. 34) that his *Mycalesis Caffra* is of the "♀" sex, Mr. Butler quotes him for the ♂, at the same time giving *M. Gambius*, Doubl., as the ♀ of *Caffra*.

Without professing to define the limits of species in so perplexing a genus as *Mycalesis*, I may be permitted to express the conviction, founded on the examination of numerous specimens, and on personal acquaintance with the living insects in various stations, that it will be found impossible to separate, as species distinct from each other, any of the South African forms above mentioned.

YPHTHIMA LISANDRA (Var. *Lara*). (p. 150).

Papilio Lara, Donovan, Nat. Repos., ii. pl. 71.

Ypthima laroides, Westw., in Gen. Di. Lep. p. 395.

I only refer to this species in order to point out that there is no ground whatever for considering it as a native of South Africa, as Donovan only gives the locality "Cape of Good Hope," under the mistaken impression that his insect is the *Lara* of Linnæus. Donovan quotes

the description in "Museum Ludovicæ Ulricæ, &c." (p. 320), which is that of a Lycænide, common in South Africa, but of somewhat uncertain relations; Doubleday referring it doubtfully to *Zeritis*, and Wallengren giving it as an *Aphnæus*, while I have placed it in *Chrysophanus*. It is stated by Donovan that his figures were copied from Jones's drawings, and that the latter were made from an example in the Linnean Cabinet,—"the individual specimen described by Linnæus;" but it is beyond doubt that Linné's detailed diagnosis applies strictly, both as regards size and markings, to the Lycænide, and not at all to Donovan's Satyride. In illustration of this, I need only mention two very obvious discrepancies, viz.: (1) while Linné's species is described as having the single ocellus in the fore-wings "*ad angulum posticum*," Donovan's figures represent it near the apex; and (2) that the "*ocellus nullus*" of the underside of the hind-wings is quite opposed to Donovan's illustration, which delineates six distinct ocelli.

XVI. *Contributions to a Knowledge of European* Trichoptera. (*First Part*). By Robert Mc Lachlan, F.L.S., Sec. Ent. Soc.

[Read 2nd November 1868.]

Under the above title I propose to publish, from time to time, as occasion may require, descriptions of new genera and species of European Trichopterous insects, with notes on synonymy and local distribution, &c., combining therewith synopses of difficult genera, and elucidatory figures. To this last mentioned feature of these contributions I attach especial importance, as an outline sketch explains readily where words fail to give an intelligible idea of the distinguishing characters. A description of a new Caddis-fly without an explanatory figure loses half its value.

The present paper contains descriptions of, or notes on, species of the following genera:—

Fam.	Phryganidæ.....Gen.	*Neuronia.*
	Limnephilidæ	*Stenophylax.*
		Halesus.
	Sericostomidæ.....	*Sericostoma.*
		Oligoplectrum.
	Leptoceridæ.....	*Molannodes.*
		Setodes.
	Hydropsychidæ	*Arctopsyche*, n. g.
		Dolophilus, n. g.
	Rhyacophilidæ.....	*Rhyacophila.*

PHRYGANIDÆ.

Neuronia Stålii, n. sp.

In size and form similar to *N. reticulata*, but with almost the colour of *N. ruficrus*. Dull black. *Antennæ* brownish-black. *Prothorax* with a few orange-coloured hairs. *Wings* shining blackish fuscous with a violaceous tinge; veins black and strong: in the *anterior wings* the costal margin (costal and sub-costal areas) is alternately marked with dull yellowish and darker fuscous spots; a white dot at the thyridium; these wings are perhaps rather broader than in *N. reticulata*, but the difference in form is very slight. *Legs* brownish-black; the posterior tibiæ, except at the base, dull ochreous; spurs testaceous.

Anal appendices as in *N. reticulata* (♂).

Småland, Sweden. I received two males from Prof. Stål, one of which he liberally presented to my collection.

When the wings are closed it has a most deceptive resemblance to small examples of *N. ruficrus*, only that the colour is more intense. The vestige of yellowish spotting on the costal margin of the anterior wings shows its affinity with *N. reticulata* and *clathrata*, with the former of which it agrees almost entirely, excepting in coloration, which difference is so striking as to preclude the possibility of its being a variety, the two examples being moreover precisely similar.

Neuronia lapponica, Hagen.

To this species belong the Lapland examples noticed by Zetterstedt under *N. reticulata* (Insecta Lapponica col. 1061). It differs from both *clathrata* and *reticulata* in the pale markings of the fore-wings and the ground colour of the hind-wings being whitish instead of orange-yellow: the dark median band of the hind-wings is absent. The legs are entirely pale, as in *clathrata*. In size it is larger than either species.

The app. inf. of the ♂ are produced at their upper edge into a very long curved spine, somewhat as in *ruficrus*; whereas they are blunt in *clathrata*, *reticulata*, and *Stålii*.

It has hitherto been found only in Lapland.

LIMNEPHILIDÆ.

Stenophylax algosus, n. sp. (Pl. XIV. fig. 6).

Reddish-brown. *Antennæ* pale brown with yellowish annulations; basal joint fuscous. *Head* fuscous, with scattered golden hairs; *palpi* reddish-brown. *Thorax* reddish-brown; prothorax thickly clothed with golden hairs. *Anterior wings* moderately long, the apex regularly elliptical; pale gray, thinly clothed with short yellowish-gray pubescence, and regularly sprinkled with small and indistinct whitish dots (four or five of these dots are placed in each apical cell), that at the thyridium being larger and more distinct; the membrane is finely granulated throughout; neuration fuscous and distinct, the longitudinal veins carrying short blackish-brown hairs; the discoidal cell scarcely so long as its footstalk; all the apical cells nearly equal in width; the first oblique

at the base and as long as the third, which is two-sided at the base; second and fourth shorter, truncate at the base; fifth acute, scarcely so long as the fourth: *posterior wings* whitish sub-hyaline, slightly grayish at the tips; fringes very short, but becoming longer at the anal angle. *Legs* yellowish testaceous, with black spines. *Abdomen* blackish fuscous, with a grayish line on each side; the terminal segment slightly reddish, and carrying a few short yellow hairs on its dorsal surface.

Anal appendices. In the ♂ the dorsal margin of the last segment is slightly rounded and rolled inwards. The appendices are small and little prominent, being hidden in the cavity of the segment; reddish. *App. sup.* almost completely concealed, appearing to be ear-shaped: *app. intermed.* moderately long, up-curved: *app. inf.* short, subtriangular, clothed and fringed with blackish hairs: *penis sheaths* short, broad and flattened, carrying a tuft of yellowish hairs at the tips: *penis* slender, and appearing to be sulcated beneath.

Expanse of wings, ♂, $12\frac{1}{2}'''$.

Southern Lapland. One male, in the collection of the Stockholm Museum.

This small *Stenophylax* will not agree with the description of any of the yet uncertain species in Zetterstedt's "Insecta Lapponica;" nor does it appear to be elsewhere noticed. It belongs to the group of *hieroglyphicus* rather than to that of *stellatus*.

Stenophylax alpestris, Kolenati.

From the Pyrenees (*Rev. T. A. Marshall*) I possess a pair of a small *Stenophylax*, which I cannot separate by any structural characters from specimens of *alpestris* from Carniola, Sweden, and England, in my collection; yet they have a somewhat different appearance, probably owing to local influences. The wings show scarcely a trace of pale markings, the pubescence is much less dense, and the veins are very strong and blackish fuscous, whereas they are weak and pale in the ordinary examples. I give below a description of the ♂ appendices of the typical form (from which the others do not differ in this respect), the figure given by Brauer (Neurop. Aust. fig. 49) being scarcely sufficiently correct.

The middle of the dorsal margin of the last abdominal segment is intensely black and scabrous, slightly rolled inwards; beneath this margin are seen the black and blunt tips of the short *app. intermed: app. sup.* small, spoon-shaped, yellow, fringed; *app. inf.* large, yellow, formed of two broad and thin plates, the inferior edge of which is excised, this edge showing a thickened geniculate portion which is continued beyond the plates in the form of a thin up-directed spine (too short and thick in Brauer's figure) which is flattened, and intensely black and shining at the tip, the thickened margin is strongly fringed internally; *penis sheaths* broad, curved upwards and inwards, appearing to be soldered together.

Genus Halesus.

In a paper on *Monocentra lepidoptera* of Rambur, which will be published in the Ann. Soc. Ent. de France, I have, in pointing out the affinity of that insect to the genus *Halesus*, proposed to divide the latter into three, viz. :—1. *Halesus* proper, including those species in which the ♂ has no pouch in the hind-wing; 2. *Drusus*, a name proposed by Stephens in his "Catalogue of British Insects," but afterwards erroneously reduced by him to a section of *Anabolia* ("Illustrations," Mandib. vol. vi.), including the species with a short pouch, and with hairy clothing; and 3. *Monocentra*, distinguished by scale-like clothing, and a long pouch in the hind-wing. All have 1, 3, 3 spurs in both sexes.

The species which should be referred to *Drusus* are very numerous, especially in mountainous countries, but are mostly undescribed. A few descriptions follow here, and, pending the appearance of the above-noted paper, they are referred to *Halesus* in the broad sense. *Peltostomis* of Kolenati can only be distinguished from *Drusus* by the spurless anterior tibiæ of the male.

Halesus (*Drusus*) Muellerı, n. sp. (Pl. XIV. fig. 3).

Black. *Antennæ* blackish fuscous, not annulate. *Head* with strong golden-yellow hairs on the face and between the antennæ: *palpi* fuscous: *occiput* slightly swollen, with a median impressed longitudinal line; two

oval reddish warts behind, whence spring long yellow hairs; and two smaller ones, scarcely reddish and more rounded, in front, placed close together. *Prothorax* thickly clothed with long golden-yellow hairs: *meso-* and *meta-thorax* deep black, almost hairless. *Anterior wings* elongate, narrow; smoky blackish, thinly clothed with short yellow hairs, and with longer ones on the cubital veins; a large milky-white spot at the thyridium and a much smaller one at the arculus; veins strong, deep blackish fuscous; discoidal cell very long; first apical cellule much longer than the third, its base extending somewhat along the upper edge of the discoidal; the second short, straight at the base; third longer than the second, nearly rounded at the base, but with a short angle, the dot near its base (common to many *Trichoptera*) black; fourth as long as the third, obliquely truncate; fifth nearly as long as the first, somewhat acute: *posterior wings* pale smoky, somewhat iridescent; the pouch in the ♂ rather long, the hairs on the veins forming it erect, very long, grayish yellow; fringes short and grayish, long at the anal portion. *Legs* with black coxæ and femora, and grayish-ochreous tibiæ and tarsi, and black spines; coxæ deeply and broadly sulcate beneath, with a row of yellow hairs on each side of the groove. *Abdomen* dull blackish, the first segment reddish at the posterior margin above, the margins of the succeeding segments grayish.

Anal appendices of the ♂: the last abdominal segment above bears in its middle an intensely black, scabrous, spade-shaped plate, flattened and slightly depressed, extending almost to the base of the segment, its apex broadly rounded, and rather wider than the base; on each side of this plate is a deep, elongate, and ochreous cavity; the margin of the segment is regularly concave, the plate not extending beyond it; *app. inf.* long and finger-shaped, nearly cylindrical, dilated at the base, ochreous, with long black hairs at the apex; *app. intermed.* intensely black, broad, and triangular, lying so close together as to appear as one piece, their bases extending downwards, and diverging, forming carinate projections on the part whence they arise, at the beginning of each of which is a rounded reddish tubercle; *app. inf.* not longer than the app. sup., ochreous, strong, sub-acute, diverging, fringed with long hairs, furnished near the base with a projecting wing-like lobe, which parts form

a deep cavity internally, in which lies the very slender and straight penis, scarcely extending beyond the lobes (♂).

Expanse of fore-wings 11‴.

Hospenthal, Switzerland (*Albert Müller*), 1 ♂.

Remarkable for the great length of the app. sup.

Halesus (*Drusus*) trifidus, n. sp. (Pl. XIV. fig. 4).

Black. *Antennæ* black, not annulate. *Head* black; occiput with two black warts posteriorly, whence spring blackish hairs, and two similar warts anteriorly; *maxillary palpi* testaceous, the terminal joint fuscous. *Prothoraæ* with long reddish-yellow hairs. *Anterior wings* short, the apex rather broad; pale fuscous, thinly clothed with short golden-brown hairs; fringes short, fuscous; the pale spots at the thyridium and arculus scarcely evident; neuration dark fuscous; discoidal cell rather short (scarcely longer than its footstalk); first apical cellule long, oblique at the base, extending to one-fourth of the length of the the upper surface of the discoidal; second short, truncate; third and fifth longer than the second, sub-acute at the base; fourth as long as the second, obliquely truncate; *posterior wings* smoky, the anal fringes long and grayish fuscous; pouch of the ♂ short, its hairs bright yellow. *Legs* fuscous, the apex of the femora, the tibiæ totally, and the first joint of the tarsi, yellowish testaceous; spines black; coxæ with yellow hairs arranged in two rows. *Abdomen* dull black.

Anal appendices of the ♂: the last dorsal segment above bears an elongate intensely black plate, the apex of which is somewhat produced, and on each side of this is a short obtuse process (hence this plate appears trifid at the apex); an ochreous cavity at each side towards the apex, otherwise this segment is totally black; *app. sup.* very small, car-shaped, yellowish; *app. intermed.* lying very close together, short, the tips turned upwards and black; *app. inf.* slightly diverging, elongately triangular, sub-obtuse, blackish externally, and clothed with blackish hairs: *penis* short, cylindrical, testaceous, slightly notched at the tip. (♂).

Expanse of fore-wings 9‴.

Departement de l'Aube, France, 1 ♂.

Halesus (*Drusus*) rectus, n. sp. (Pl. XIV. fig. 5).

Fuscous. *Antennæ* fuscous, narrowly annulate with yellow on the basal third. *Head* narrowly transverse, the eyes very prominent; blackish, occiput with two tubercles posteriorly, whence spring long yellow hairs, and two anteriorly, placed quite between the basal joints of the antennæ; *front* thickly clothed with yellow hairs: *maxillary palpi* testaceous. *Prothoraæ* densely clothed with long yellow hairs: *meso-* and *meta-thoraæ* fuscous, hairless. *Anterior wings* rather short and broad, the apex somewhat dilated; grayish yellow, thickly clothed with short yellow pubescence, neuration fuscous; discoidal cell short, not longer than its footstalk; first apical cellule rather longer than the third, oblique at the base; second shorter, truncate; third longer than the second, sub-acute; fourth as long as the second, and oblique; fifth longer than the third, very oblique, almost acute at the base; a whitish dot at the thyridium and at the arculus; *posterior wings* pale grayish, sub-hyaline; pouch of the ♂ short, the hairs yellow, fringes gray. *Legs* yellowish, the terminal joints of the tarsi, and the coxæ, fuscescent, the latter with two rows of yellow hairs. *Abdomen* with the basal segments testaceous, the apical fuscous, each with a broad ochreous posterior margin.

Anal appendices of the ♂: the surface of the last dorsal segment is deep black, the median portion scabrous, truncate at the apex, the sides elevated into a ridge leaving a broad depressed space between; on each side of this space, near the middle, is a long golden hair; the lateral edge below the ridge shows an ochreous excision: *app. sup.* very small, the apex fuscescent; *app. intermed.* short, intensely black at the tips, which appear as two rounded tubercles springing from a transverse semicircular plate at the base, which plate forms the upper cover of a deep cavity within (seen *en face*); *app. inf.* long, widely divergent, subcylindrical, obtuse, slightly curved upwards: *penis* scarcely visible (♂).

Expanse of fore-wings $9\frac{3}{4}'''$.

Pyrenees (*Rev. T. A. Marshall*), 1 ♂.

SERICOSTOMIDÆ.

Sericostoma carinthiacum, n. sp. (Pl. XIV. fig. 8).

Blackish. *Antennæ* pale yellow, each joint with a broad brown apical ring; first three or four joints wholly brown. *Head* blackish, thickly clothed with blackish and golden hairs intermingled; a tuft of orange-yellow hairs on the vertex between the basal joints of the antennæ; *maxillary palpi* closely masking the face, blackish and densely clothed with blackish hairs; *labial palpi* pale brown. *Thorax* blackish; the hinder part of the mesothorax and the attachments of the anterior wings somewhat reddish. *Anterior wings* long, longly elliptical at the apex, uniformly blackish-brown with golden-brown hairs; fringes blackish-gray: *posterior wings* smoky-black with blackish-gray fringes. *Legs* all bright yellow with the femora somewhat dingy yellow; the anterior tarsi faintly annulate with brown; tibiæ and tarsi internally with short black spines. *Abdomen* blackish. *Anal appendices* reddish: *app. sup.* small, flattened pear-shaped, strongly fringed; *app. inf.* of the usual form; *app. intermed.* deeply furcate, the prongs nearly equal in length, each being very acute, and slightly curved at the tips in opposite directions; *penis* long and thin, the apex excised above; *sheaths* slender, cylindrical, thickened and incurved at the tips; *ventral triangle* small, somewhat obtuse, but with the apex produced (♂).

Expanse of wings 12‴.

Preth Valley, Upper Carinthia, 26th May (*Zeller*), 1 ♂.

In the colour of the antennæ and legs this insect resembles *S. Selysii*, Ed. Pictet, and *S. sp. nov. No.* 5, of Hagen in the Stettin Zeitung for 1859, p. 148 (afterwards in his "Synopsis Synonymica," named *S. timidum*); and it is no doubt allied thereto, but the form of the app. intermed. and of the ventral triangle seem sufficiently to separate it.

Sericostoma faciale, n. sp. (Pl. XIV. fig. 7).

Blackish fuscous. *Antennæ* brown, not annulate. *Head* with tufts of blackish hairs at the angles of the occiput, and a tuft of orange-yellow hairs on the vertex between the basal joints of the antennæ; *eyes* coppery in dead

specimens; *maxillary palpi* very large and greatly dilated, standing out distant from the face, and not masking it as in other species of the genus, pale yellow, thinly clothed externally with blackish hairs; *labial palpi* shorter than in other species, the middle joint broader than the others, brown. *Prothorax* with golden-brown hairs. *Anterior wings* obtuse, obscure golden-brown, with an appearance of longitudinal yellowish streaks, whereof that in the sub-costal area is the most conspicuous; apical fringes black with a pale interruption near the anal angle: *posterior wings* smoky blackish, with blackish gray fringes. *Legs* all yellow, the femora somewhat dingy, the posterior tibiæ and tarsi brighter than the others.

Anal appendices reddish: *app. sup.* dilated and strongly fringed; *app. inf.* very strongly dilated, the superior portion above the notch very much the larger; *app. intermed.* broad, deeply furcate, the prongs curved upwards and the lower much longer and broader than the upper; *penis* shining testaceous, long, the apex notched above, pointed beneath; *sheaths* cylindrical, slightly bent, the tips thickened and curved inwards; *ventral triangle* broad and very obtuse, the margins slightly sinuate (♂).

Expanse of wings 11‴.

Switzerland, on the Aar (*Eaton*).

I have only one male of this species, which in the form of the maxillary palpi differs from all others, these organs being widely separated from the face and greatly dilated, whereas they, as a rule, lie closely pressed against the front, and mask the face; the form of the app. intermed. is also very different from any other species with which I am acquainted.

Genus Oligoplectrum.

I propose this name for Rambur's genus *Dasystoma*, which name was previously applied to Curtis to a genus of *Lepidoptera*.

Oligoplectrum morosum, n. sp.

Almost entirely black; the *fore-wings* clothed with thick blackish-brown pubescence; the radius without a bend; transverse veinlet uniting the ramus thyrifer and ramus discoidalis, placed almost level with that closing the

discoidal cell (or slightly nearer the apex) : *antennæ* beneath with indistinct paler annulations : the two end joints of the *maxillary palpi* equal, extending beyond the head. *Legs* brownish black, the knees pale. *Abdomen* with a whitish line on each side: the margins of the segments and the appendices slightly grayish testaceous ; *app. sup.* forming two broad triangular plates, so closely placed together as almost to appear as one piece ; *app. inf.* very small, having the appearance of being formed of two nearly equal joints (♂).

Expanse of wing 6‴.

Raibl Valley, Upper Carinthia (*Zeller*) in July ; 20 ♂.

I cannot reconcile this insect with the description of any of the species described by Hagen in the Stett. Ent. Zeit. 1868, p. 267-273. It appears to come nearest to *mœstum*, Hagen, from Spain, of which the ♀ only is known ; but even the ♂ of *morosum* is larger than the ♀ of *mœstum*.

From the same locality I have a ♀ which I cannot doubt belongs to the above-described males, although its size is much greater (expands 8½‴), and it has the appearance of a *Silo*. The abdomen is injured. The characters the same as in ♂, excepting the size.

LEPTOCERIDÆ.

Molannodes Zelleri, McLachlan.

I have received examples of this apparently very local insect from Prof. Stål, taken in Småland. My other specimens have their wings expanded, but these are pinned in the natural position assumed by the insect when at rest, and in this position they especially show the affinity of the genus with *Molanna*.

Setodes mœstella, n. sp.

Fuscous. *Antennæ* very long and slender, one-third longer in the ♂ than in the ♀, silvery-gray with a brownish tinge, not annulate ; basal joint long and moderately stout, clothed with grayish-brown hairs. *Head* thickly clothed with long grayish-brown hairs in tufts. *Maxillary palpi* very long, fuscous, clothed with grayish-brown pubescence ; first joint short ; second, third, and fourth, long, nearly equal, the fourth thinner ; fifth nearly as long as the third and fourth united, thin and flexible. *Thorax* slender, blackish-fuscous, hairless.

Wings fuscous, unicolorous, densely clothed with fuscous pubescence, showing a slight reddish tinge; fringes very long and dense, brown with a golden reflection in certain lights: *anterior wings* slightly acute; neuration not visible unless the hairs be removed; subcosta joining the costa beyond the middle; radius running nearly to the apex, bent beyond the middle; discoidal cell long; arrangement of the veins generally as in *S. reducta* (vide "*Trichoptera Britannica*," pl. vii. fig. 1); the three transverse veinlets in an oblique continuous line as in *S. reducta*; the longitudinal veins are fuscous, the transverse veinlets whitish hyaline. *Legs* wholly silky silvery-gray; anterior tibiæ with one short and stout spur. *Abdomen* blackish fuscous, the margins of the segments narrowly edged with whitish, and there is a whitish (probably greenish in life) stripe on each side.

Anal appendices. In the ♂ there is a short triangular black lobe in the middle of the dorsal margin of the last abdominal segment, and beneath this another long and slender lobe which is probably the upper penis cover; *app. sup.* short and broad, concave beneath, fuscous, fringed with long golden-gray hairs; *app. inf.* short, dilated at the base, the apical portion thinner, crooked, and directed upwards; in the cavity of the segment is seen a short yellow tubular piece, open at the end, enclosing the short penis (Pl. XIV. figs. without a number). In the ♀ there are two short superior lobes, longly fringed, very similar to the app. sup. of the ♂, and between these is a longer lobe, concave internally; the oblique apex of the last segment, seen from beneath, is greenish and shining.

Expanse of wings, ♂ and ♀, $6\frac{1}{4}'''$.

Preth Valley, Upper Carinthia (*Zeller*), 2 ♂, 1 ♀.

This is evidently closely allied to *S. filicornis*, Pictet, (Récherch. p. 171, pl. xii. fig. 6), and may possibly be a form thereof. The type sent by Pictet to Curtis has lost its abdomen, and the wings are entirely denuded; the neuration appears to be the same. The colour of *filicornis* should be decidedly paler than that of *mœstella*, and Pictet says of the antennæ, "d'un fauve clair," and of the legs "rougeâtres" (with which the type agrees moderately well), whereas these parts are delicate silvery-gray in *mœstella*. Perhaps a ♀ from Zeller's original collection, without locality, may pertain to *filicornis*. *S. fusca* of Brauer is somewhat similar in its uniform dark coloration, but differs in the annulate base of the antennæ.

HYDROPSYCHIDÆ.

Arctopsyche, n. g. (Pl. XIV. fig. 1).

Antennæ not so long as the wings, stout, distinctly serrate internally, the joints all short and gradually decreasing in thickness. *Head* broad, vertex hairy and tuberculate. *Ocelli* absent. *Eyes* prominent. *Maxillary palpi* short; first joint very short; second and third longer, nearly equal, broad; fourth shorter than the third, and thinner; fifth about the length of the second and third united, very slender and multi-articulate. *Labial palpi* very small.

Thorax stout and slightly hairy; meso-thorax with a broad median longitudinal impressed space.

Wings broad, slightly pubescent and sub-hyaline, somewhat acute, fringes very short; the posterior pair shorter and slightly broader than the anterior, folded. *Anterior wings* with the costa nearly straight, and the apex longly elliptical; sub-costa and radius running nearly parallel for their whole length, united before their termination by a straight transverse veinlet, each being slightly indented at that point; an oblique (not distinct) transverse veinlet uniting the costa and sub-costa at about the middle; discoidal cell small and triangular, closed by a transverse veinlet, and united to the radius by a veinlet placed almost in a line with that closing the cell; cellula thyridii longer than the discoidal, extending much beyond it towards the base, and reaching to its middle towards the apex, closed by a straight veinlet; a very oblique veinlet unites the ramus thyrifer to the ramus discoidalis, placed between those which close the discoidal cell and cellula thyridii respectively; a veinlet unites the base of the cellula thyridii with the ramus clavalis; and there is yet another below this near the base; apical forks 1, 2, 3, 4, and 5, all present: 1 and 2 short; 3, 4, and 5, long. *Posterior wings* with the costal margin slightly excavated; apical forks 1, 2, 3, and 5 present; discoidal cell as in the anterior.

Legs long; intermediate tibiæ and tarsi very strongly dilated in the ♀; spurs 2, 4, 4, long, the pairs slightly unequal.

Abdomen short and robust, appendices of the ♂ complicated; in the ♀ the apex is obtuse, and furnished with short valves.

This genus is founded upon *Aphelocheira ladogensis* of Kolenati, and an undescribed species, *A. obesa* of Hagen. These agree with *Aphelocheira* of Stephens (*Diplectrona*, Westwood, *nec* Kolenati) in scarcely any particular, save in the internally serrate antennæ, being robust insects with the *facies* of the larger species of *Hydropsyche*; the presence of a median transverse costal veinlet and the very greatly dilated intermediate legs of the female especially separating the two genera.

The two known species both inhabit Northern Europe; the following description of the appendices of *ladogensis* is made from specimens from Lapland.

Appendices of the ♂ all yellowish or testaceous, contrasting strongly with the black abdomen, the apical margin of the last segment of which is truncate; *app. sup.* finger-shaped, rounded at the apex, and hairy; *app. inf.* very short and broad, produced internally at the base; *app. intermed.* long and shining, curved strongly downwards, parallel, the apex acute, the apical half slender, the basal half slightly thickened; from between the app. intermed. proceed two long *sheaths*, lying closely together, the apical portion being suddenly dilated and rounded; below these sheaths is the very large *penis*, which is deeply canaliculate above in its basal portion, the apical portion being very obliquely truncate and dilated, furnished with a strong triangular spine-like tooth in its middle above. The ♀ shows only inconspicuous valves at the apex.

Dolophilus, n. g. (Pl. XIV. fig. 2).

Antennæ shorter than the wings, stout (the apical portion spirally twisted in dead specimens of the ♂), the joints nearly cylindrical; after the apical third the sutures are furnished with short and somewhat verticillate hairs; the basal joint scarcely longer than the others. *Head* densely pilose. *Ocelli* present, but concealed in the dense hairs of the vertex. *Maxillary palpi* long and pubescent; the two basal joints very short, the second being broader and stouter than the first; third joint very long and slender; fourth one-third the length of the third; fifth scarcely longer than the third, more slender and multi-articulate. *Labial palpi* small, the basal joint short, the second and third long and slender. *Eyes* prominent.

Anterior wings densely pubescent, long, elliptical at the apex; sub-costa joining the costa at about a third of the length from the apex, an oblique transverse veinlet uniting it to the costa before the middle; radius considerably longer than the costa, united to the sub-costa by a short transverse veinlet; discoidal cell long and narrow, closed; cellula thyridii internally one-third longer than the discoidal and narrower, also closed; a transverse veinlet uniting it to the discoidal, placed rather within the two, closing the above-named cells; two transverse veinlets towards the base, one placed between the ramus thyrifer and ramus clavalis, and the other, nearer the base, between the latter vein and the cubitus; apical forks 1, 2, 3, 4 and 5, all present: 1 and 2 long and narrow, reaching the discoidal cell; 3 and 4 short and broader, 4 being longer than 3; 5 very long, reaching nearly halfway to the base of the wing: fringes short.

Posterior wings slightly broader and one-fifth shorter than the anterior, folded, the fringes slightly longer; less densely pubescent and sub-hyaline; the sub-costa and radius nearly as in the anterior, united towards the apex by a transverse veinlet; discoidal cell nearly as in the anterior (a transverse veinlet uniting it to the radius is somewhat doubtful); a short transverse veinlet below it, and two others towards the base; forks 1, 2, 3 and 5 present; 1 not reaching the discoidal cell; 2 reaching that cell, broader; 3 short and triangular; 5 very long and broad.

Legs slender, the posterior pair very long; the intermediate tibiæ and tarsi not dilated in the ♀. Spurs 2, 4, 4, pairs nearly equal, those on the intermediate and posterior tibiæ very long.

Abdomen short and moderately stout; in the ♂ the app. sup. are moderately long; app. inf. very long, two-jointed and obtuse: in the ♀ the apex of the abdomen is truncate, with a short ovipositor.

The insect on which I have founded this genus has a most deceptive resemblance to a species of *Wormaldia*, and in the form of its maxillary palpi, densely hairy wings, sombre colour, and general form, it agrees almost entirely with that genus; but the neuration of the anterior wings is different, possessing as it does fork 4, which is wanting in *Wormaldia*, and thus, in this respect, it approaches *Philopotamus*. Its natural position is between these two genera.

The neuration of *Oncocerus pallescens*, Kolenati, according to the figure in the Gen. et Spec. Trichop. pt. 2. tab. v. fig. 53, should have fork 4, but Herr Brauer informs me that the type of that insect in the Vienna Museum is undoubtedly *Wormaldia occipitalis*.

Dolophilus copiosus, n. sp. (Pl. XIV. fig. 2).

Antennæ brown, narrowly annulate with yellowish ochreous. *Head* blackish, very densely clothed with long golden-yellow hairs; hinder portion of the occiput with two long oval reddish swellings, strongly punctured, and with two reddish tubercles in the middle (these protuberances are visible only when the hairs are denuded): *ocelli* whitish: *eyes* black: *palpi* brown. *Prothorax* densely clothed with golden hairs; and similar hairs, in tufts, at the attachments of the anterior wings; integuments of thorax blackish.

Anterior wings smoky fuscous, somewhat shining, very densely clothed with short golden pubescence; fringes golden-gray; veins fuscous: *posterior wings* smoky, subhyaline and iridescent; fringes grayish-brown.

Legs reddish-yellow, the spurs, femora, and anterior tibiæ, externally brownish.

Abdomen dull blackish, thinly clothed with pale yellowish hairs.

Anal appendices of the ♂ fuscous: the terminal margin of the last dorsal segment is truncate: *app. sup.* rather long, sub-triangular and rather acute; *app. intermed.* straight, acute, long, placed between the app. sup. and closely applied one against the other; *app. inf.* nearly twice the length of the app. sup., closely applied one against the other, two-jointed, the joints flattened, nearly equal in length, the apical one being very obtuse, the basal one somewhat dilated at the base; no appearance of the penis or sheaths. In the ♀ the last abdominal segment is truncate, with a short protruding yellowish ovipositor (♂ ♀).

Expanse of wings 6-8‴.

Preth and Raibl Valleys, Upper Carinthia (*Zeller*); abundant in June. I received upwards of twenty examples from Prof. Zeller.

RHYACOPHILIDÆ.

Genus Rhyacophila.

Though most of the numerous species of this genus (restricting it to those in which the dorsal margin of the last segment is prolonged in the middle) resemble each other greatly in general appearance, they possess most satisfactory characters in the appendices of the ♂; the ♀ on the contrary can, in many cases, only be properly paired by observing the insects in their native haunts.

Without entering into lengthy descriptions, I propose, with the aid of figures, to notice the distinctive characters of several of the closely allied species, in amplification of Hagen's synopsis in the Stettin Zeitung for 1859, pp. 153, 154.

R. torrentium, Pictet, is so different from the others both in size, colour, and the formation of the lobe and appendices, as to prevent the possibility of mistake—Vide Brauer, Neurop. Aust. fig. 21.

R. dorsalis, Curtis, and *R. vulgaris*, Pictet. In general appearance, in the app. inf., and in the form of the dorsal lobe of the last segment these two species agree remarkably; the lobe is perhaps rather less dilated at the extremity in *vulgaris*. The principal difference, as noted by Hagen, consists in the form of the penis, which, in *dorsalis* is simple with (ordinarily, but not always) downward-directed spine-like sheaths (Pl. XIV. fig. 13), whereas in *vulgaris* it bears a blunt sub-triangular projection on its under side about the middle, with up-directed sheaths (Pl. XIV. fig. 12). The figure of the appendices of *dorsalis* in my "Trichoptera Britannica" is incomplete, the engraver having omitted the app. sup. The type of *vulgaris* sent to Curtis by Pictet, does not show the form of the penis very distinctly.

R. paupera, Hagen, differs from the above two species in its darker coloration, in the dorsal lobe, which is not dilated at the end and is shorter than the app. sup., and in the straight penis-sheath (Pl. XIV. fig. 14).

R. fasciata, Hagen, may be distinguished almost with certainty by the dark fasciæ on the anterior wings. The form of the dorsal lobe is very distinct from the preceding, being broad and rounded, and nearly concealing the app. sup. The second joint of the app. inf. is obliquely truncate (Pl. XIV. fig. 16). I have three ♂ from Carinthia from Zeller.

R. septentrionis, McLachlan, from Scotland, has a dorsal lobe and appendices (Pl. XIV. fig. 15) very similar to *fasciata*. In coloration and general form it is very distinct, the wings being dark, broad, and somewhat rounded, whereas they are pale, narrow, and longly elliptical in *fasciata*.

R. ferruginea, (Scopoli), Hagen. I have not seen this insect, which, according to Hagen (*in litt.*) is smaller than *septentrionis*, but with similar lobes and appendices. Scopoli's name cannot be said to apply to this species with certainty.

R. aurata, Brauer. The wings almost unicolorous golden-yellow, occasionally with faint darker markings, and a trace of the large pale dorsal spot common to most species of the genus. The dorsal lobe is long and linear, the second joint of the app. inf. deeply furcate, the branches divergent and straight, the lower being broader than the upper; the penis-sheaths are very broad at the base, afterwards produced into a long spine, curved at the tip. (Pl. XIV. fig. 11). Apparently a common species in the mountains of Central Europe.

R. venusta, (Pictet, M.S.). This species was formerly wrongly united to *R. aurata* by Hagen (Stet. Zeit. 1859, p. 154), but was afterward ("Synopsis synonymica") separated by him therefrom. It has never been described. Strongly marked individuals show a distinct dorsal pale blotch on the anterior wings, and there are semi-fasciate gray markings, especially towards the apical portion of the wing. Specimens from the Alps and Italy, in my collection, are larger than others taken by Zeller in Upper Carinthia. The dorsal lobe in the male is dilated in the middle and acuminate at the apex (one Alpine individual has this lobe of nearly uniform breadth throughout, but it is not otherwise different); the second joint of the app. inf. is furcate, the two branches curved in such a manner as to leave a nearly circular space between them, both branches being almost equal in length, but the lower is considerably the stronger; the basal piece whence arise the penis and sheaths is produced at its lower edge into a long process, obtuse and curved at the apex, and deeply canaliculate beneath; the penis is short and straight, and does not project beyond this process, the sheaths curved at the tips (Pl. XIV. fig. 9)*

* The appendices figured by Pictet at Pl. iv. fig. 29, and the pupa at Pl. xv. fig. 1c, referred to *R. vulgaris*, belong to *R. venusta*.

R. meridionalis, Ed. Pictet. This Pyrenean species, which I have not seen, much resembles *venusta* in the form of the lobe and appendices, according to the description and figures; the penis and sheaths are not mentioned. In size and colour it should be abundantly distinct.

R. intermedia, n. sp. Somewhat intermediate between *aurata* and *venusta*, but approaching nearer to the latter in general appearance; the fore-wings pale, with indistinct grayish markings and pale dorsal blotch. The dorsal lobe not dilated in the middle, nor acuminate; the second joint of the app. inf. furcate, the branches being very unequal; the upper short and thin, the lower longer and stout, scarcely divergent, and nearly straight; the penis is of a very extraordinary form, broad, and forming a keel above, the sides deflexed, produced into a spine at the apex with a small tooth above, the angles of the deflexed portion very acute; the sheaths are slender and strongly curved, the extreme apex being directed upwards; there is no produced base whence these parts arise (Pl. XIV. fig. 10). Of this very distinct species I possess two males from Zeller, one from Upper Carinthia, the other from Bruck, in Styria.

R. obliterata, McLachlan, and *R. munda*, McLachlan, apparently peculiar to Britain, can be readily recognised from the figures of the appendices in my "Trichoptera Britannica."

R. stigmatica, Kolenati, is quite unknown to me. It has furcate app. inf., but the description is too little precise to be satisfactory.

R. glareosa, McLachlan. I now give a figure of the remarkable appendices of this species (Pl. XIV. fig. 17). In my description (Stett. Zeit. 1867, p. 62) the words "appendicibus superioribus" are an obvious misprint for "appendicibus inferioribus."

The number of described European species of *Rhyacophila* is now fifteen, excluding, of course, the group of *umbrosa* (to which it has been proposed to apply Kolenati's generic term *Crunophila*;)* viz.:—*torrentium*, Pictet;

* It will probably be better to defer the generic separation of these forms *sine die:* the most important differential character is the absence in the larva of *umbrosa* of external respiratory filaments; hence our knowledge of the earlier states of both groups will require much further extension before a correct idea can be formed. The other character of the presence or absence of the dorsal lobe in the ♂ insect is rendered unsatisfactory by the existence of *R. munda*, *glareosa*, and North American forms.

dorsalis, Curtis; *vulgaris,* Pictet; *paupera,* Hagen; *obliterata,* McLachlan; *fasciata,* Hagen; *septentrionis,* McLachlan; *ferruginea,* (*) Hagen; *aurata,* Brauer; *intermedia,* McLachlan; *venusta,* Pictet, M.S.; *meridionalis,* (*) Ed. Pictet; *stigmatica,* (*) Kolenati; *munda,* McLachlan; and *glareosa,* McLachlan. The three species marked with an asterisk (*) have not been seen by me. I possess all the others. There can be no doubt that this list very inadequately represents the actual number that exist in Europe. All the species frequent swiftly-running streams and torrents, especially in mountainous districts, and when these shall have been more diligently explored, I look forward to the number being doubled; perhaps also some means of pairing the sexes may then be discovered.

Explanation of Plate XIV.

Fig. 1. *Arctopsyche ladogensis*, neuration of wings; 1*a*, appendices of ♂, from above; 1*b*, from side; 1c, maxillary palpus.

2. *Dolophilus copiosus*, neuration of wings; 2*a*, appendices of ♂, from side; 2*b*, of ♀; 2*c*, maxillary palpus.

3. *Halesus* (Drusus) *Muelleri*, appendices of ♂, from above; 3*a*, from side (*a*, dorsal lobe; *b*, app. intermed.; *c*, app. sup.; *d*, app. inf.; *e*, penis).

4. *Halesus* (Drusus) *trifidus*, appendices of ♂, from above; 4*a*, from side.

5. *Halesus* (Drusus) *rectus*, appendices of ♂, from above; 5*a*, from side.

6. *Stenophylax algosus*, appendices of ♂, from above; 6*a*, from side.

7. *Sericostoma faciale*, appendices of ♂, from side; 7*a*, ventral triangle; 7*b*, app. intermed.; 7*c*, head and palpi.

8. *Sericostoma carinthiacum*, appendices of ♂, from side; 8*a*, ventral triangle; 8*b*, app. intermed.

Explanation of Plate XIV (*continued*).

Fig. 9. *Rhyacophila venusta*, apex of abdomen of ♂, from above, (the app. inf. abbreviated); 9*a*, app. inf., from side; 9*b*, penis and sheaths, from side.

10. *Rhyacophila intermedia*, apex of abdomen of ♂, from above; 10*a*, app. inf., from side; 10*b*, penis-sheath and valve, from side.

11. *Rhyacophila aurata*, apex of abdomen of ♂, from above; 11*a*, app. inf., from side; 11*b*, penis-sheath, from side.

12. *Rhyacophila vulgaris*, apex of abdomen of ♂, from above; 12*a*, app. inf., from side; 12*b*, penis and sheaths, from side.

13. *Rhyacophila dorsalis*, apex of abdomen of ♂, from above; 13*a*, app. inf., from side; 13*b*, penis and sheaths, from side.

14. *Rhyacophila paupera*, apex of abdomen of ♂, from above; 14*a*, app. inf., from side; 14*b*, penis and sheaths, from side.

15. *Rhyacophila septentrionis*, apex of abdomen of ♂, from above; 15*a*, app. inf., from side.

16. *Rhyacophila fasciata*, apex of abdomen of ♂, from above; 16*a*, app. inf., from side.

17. *Rhyacophila glareosa*, apex of abdomen of ♂, from above; 17*a*, from side.

Two unnumbered figures on the right hand side of the Plate near the middle, represent *Setodes mœstella*, apex of abdomen of ♂, from above, and from side.

XVII. *Descriptions of New Genera and Species of* Heteromera. By Frederick Bates.

[Read 2nd November, 1868.]

The insects described in this paper belong to the following families and genera:—

Fam. Tenebrionidæ.....	Gen. *Aryenis*, (n. g.).
	Goniadera, Perty.
	Ædiatorix, (n. g.).
Cistelidæ	*Chromomœa*, Pascoe.
Lagriidæ.....	*Xenostethus*, (n. g.).

In addition to which, three other genera of *Tenebrionidæ* are proposed, namely, *Chorasmius*, *Æmymone*, and *Gamaxus*.

Fam. TENEBRIONIDÆ.

Sub.-Fam. Tentyriinæ.

Aryenis, n. g. (Pl. XV. fig. 1).

Taking *Orbignianus* as the type of Guérin's genus *Evaniosomus*, the present genus differs from it in the following particulars: *form* more elongate, slender, depressed: anterior margin of the *mentum* crenulate, not denticulate, *mandibles* much thinner, less strongly curved, and less deeply cleft, at their extremity: *epistoma* less contracted anteriorly: *head* narrower, less robust, a little more contracted behind, with the neck a little longer and thinner: *eyes larger, more prominent, transverse, approximate beneath: antennæ* elongate, slender; the joints gradually becoming of a more cylindrical form as the extremity is approached: joint 3 longer than 2 or 4: 5-10 elongate, subequal: 11 scarcely longer than 10, gradually attenuated to the apex, which is somewhat obtusely pointed: *prothorax* narrow, subcylindrical: *scutellum* much larger: *elytra* elongate, slender, but little convex, flattened or depressed on the discs, not suddenly declivous behind, not carinate; very gradually widened to beyond the middle, thence gradually contracted to the apex: *epipleural fold* subvertical, sinuous—but not arched—broad at the shoulders or base, then suddenly contracted, and continuing moderately narrow to the hind extremity:

metasternum elongate: epimera of the mesothorax oblique, triangular, not sublinear; prosternal process terminating behind in a small, compressed, pointed tubercle: *legs* and *tarsi* much more slender, the hind tibiæ sinuous.

This genus will form the type of a new section or "group" in the subfamily: distinguished from its allies by its elongate, slender, and depressed form: its large transverse eyes, approximate beneath: subcylindrical prothorax—the pronotum being confounded with its parapleuræ: long, narrow, depressed elytra—not suddenly declivous behind; elongate metasternum; and simple epistoma. From Thomson's genus *Evelina* (Musée Scientif. p. 22)—which must be nearly related—it may at once be distinguished by its *hexagonal mentum, large transverse eyes,* and *triangular intercoxal process.* The *Evaniosomus procerus,** Erichson, (Archiv. 1847, I. p. 113) has also some points of resemblance to *Aryenis,* but the form of the eyes, prothorax, elytra, &c., are quite distinct.

An example of the present genus stands labelled in the Lafertéan collection "*Isotoma rufescens,*" an insect included by Dejean in the old family *Trachelides,* Lat., and there is certainly some excuse for so placing it, as in its head contracted behind into a neck; its somewhat protuberant anterior coxæ; large, approximate eyes; and slim and elegant habit—it is marvellously like some species of the genus *Statira.*

Aryenis rufescens, n. sp. (Pl. XV. fig. 1).

Length $4\frac{1}{4}$ to $4\frac{1}{2}$ lines; entirely (save the eyes which are more or less black) of an uniform pale rufous or yellowish ferruginous, with the palpi a little paler; shining; mentum rather strongly, but not closely, punctured; epistoma much produced anteriorly, confounded with the front; head with the long slender carina, or supra-orbital ridge, within each eye, as in *Evaniosomus,* but slighter and fainter; somewhat strongly rugose-punctate

* I think this species generically distinct from *Evaniosomus* by its differently formed antennæ, having joint 3 decidedly longer than 2 or 4: its non-carinate elytra: the epipleural fold broadest at the shoulders, not arched nor expanded in the middle; its subelongate metasternum; the subtriangular form of the epimera of its mesothorax, &c. I propose to name it *Chorasmius.* (See Pl. XV. fig. 2).

between the eyes, the punctures very elongate; neck and epistoma very sparingly and finely punctate; prothorax long, narrow, subcylindrical, moderately convex; squarely truncate at each extremity, with the margins very finely and slightly reflexed; somewhat closely—save down the median line—and evenly punctured, the flanks more sparingly so; faintly impressed down the median line, and with two ill-defined depressions at each side, near the base; scutum of the mesothorax closely punctured; scutellum large, subpentagonal, smooth, thickened at the sides; elytra elongate, narrow, flat on the discs, with a slight callosity on each side of the suture, at the base; as broad again as the prothorax at the base, which is somewhat arcuately emarginate, and thickened; shoulders broadly rounded, sinuous at the sides, with the edges, especially towards the base, reflexed; slightly widening behind the middle, thence gradually and somewhat sinuously contracted to the apex, which is pointed; the sutural margin slightly raised and thickened; vaguely, especially at the base, punctate-striate; the sutural and marginal striæ meeting at the apex of the elytra and enclosing the remainder; interstices nearly flat, irregularly punctate; epipleural fold faintly rugulose towards the base; underside and abdomen very glossy; finely, but not closely, punctured; legs and antennæ rather strongly punctured, the terminal joints of the latter very finely pubescent: thighs clavate or incrassate; tarsi beneath fringed with short spinose hairs, with others, scattered and decumbent, above; first joint of the posterior pair longer than the last.

Hab.—Pampas of the Argentine Republic.

It is just possible the above species may be identical with the *Statyra unicolor* (Blanch. in d'Orbig. Voy. Amer. merid. p. 199), but his description is too short and vague to enable me to decide this point; judging from the figure given in his work (pl. 15, fig. 2), this species has the prothorax more elongate, and the callosities at the base of the elytra much less pronounced.

I have recently acquired another species from Peru, belonging to this group, which will not accord with any genus yet published; I hesitate to describe it as I dread unnecessarily to multiply the number of genera, and should be glad of assistance, by the loan of specimens and otherwise, so as to enable me properly, if possible, to define the limits of the genera in this interesting group.

Sub.-Fam. TENEBRIONINÆ.

Gen. Goniadera, Perty, Del. Anim. Artic. Brasil, p. 62; Lacord. Genera, v. p. 391.

Goniadera interrupta, n. sp. (Pl. XV. fig. 3).

Length 5¾ lines:—entirely dull bluish black; legs, antennæ, and undersurface deep shining black; labial palpi bright red, the maxillary and labrum dark castaneous: this latter punctured, and with a few longish hairs; epistoma also with a few longish hairs, very short, but little thickened, broadly emarginate in front, and—together with the head—very coarsely and irregularly rugose-punctate; the impression separating it from the front well marked, broad, smooth in the middle; *head* short, transverse, the space behind the eyes much abbreviated, so that the hind angle of the eye nearly touches the furrow separating the head from the neck: this latter cellulose-punctate above, more strongly so on the middle than on the sides; *antennæ* rather short, moderately stout, and setulose, the terminal joints closely punctured, and—especially the last—pubescent; joint 2 very short and very broad; 3 longer than the following, obconic; 4-10 sub-cylindrical, becoming very gradually broader; 11 large, robust, ovoid; *prothorax* broader than long, but little convex; the surface rough with irregular, subconical, polished tubercles, and having a few short, scattered, squamose hairs; anterior margin squarely truncate in the middle: the dilated sides produced in front, and forming large prominent angles, reflexed and sub-acute; sides strongly rounded a little before the middle, thence contracted in a curve to the base, which has its margin squarely truncate in the middle, its angles broadly, obliquely, and triangularly excised and pointed; * the attenuated lateral margins rather broad, especially from the middle to the front, somewhat reflexed, their edges tuberculate; *scutellum* large, gradually arched behind, rugose-punctate; *elytra* rather short, convex, rather strongly declivous behind, broader than the prothorax at the base, which is slightly but broadly emarginate;

* In some species of *Goniadera* the base of the thorax is thus formed, in others the hind angles are obliquely truncate.

shoulders somewhat prominent but rounded, gradually widening to three-fourths their length, thence sinuously contracted to the apex, which is somewhat acute ; lateral edges sharp, strongly sinuous, tuberculate on their basal fourth ; on each elytron a row of variously sized tubercles down by the suture, extending to the extreme apex, the tubercles becoming linear-elongate as they approach the hind extremity ; besides this, there are nine more or less strongly interrupted, elevated, polished lines or ridges; 2, 4, 6 and 8 being the most continuous ; 2 and 6 are united near the hind extremity, and enclose 3, 4 and 5 ; 1, 3, 5 and 7 are much broken up, consisting of but distant elongate tubercles, and row 9, which is submarginal, is much abbreviated at each end, and consists of small sub-elongate tubercles ; the intervals are pitted with large shallow punctures, much more strongly and closely so on the epipleuræ or inflexed sides of the elytra, and have a few short scattered squamose hairs, more plentifully distributed at the hind extremity ; the epipleural fold is strongly sinuous, sub-horizontal in the apical half, suddenly expanded near the hind extremity, and very deeply and closely punctured, especially at the base ; parapleuræ, sides of sterna, and sides of abdomen, sparingly impressed with large coarse punctures ; cheeks and head beneath, coarsely rugose-punctate ; thighs and tibiæ compressed, impunctate, the former attenuated at the base, and all simple ; the fore tibiæ are very slightly curved, somewhat thickened within, close to the apex, in the form of a broad blunt tooth, and fringed with short hairs ; the intermediate and hind tibiæ are very slightly sinuous, with the apex of the latter acutely produced within ; save the anterior (on which two very short spurs may be detected) the tibiæ are without spurs ; the prosternal process terminates behind in a small compressed point.

Hab.—Pebas, in Peru ; collected by Mr. Hauxwell.

It is with considerable hesitation (hence the lengthy description) that I include the above species in the genus *Goniadera*, there being a decided *tendency* in the penultimate joint of the tarsi to assume the sub-bilobed form characteristic of the next sub-family—the *Heterotarsinæ :* in this respect, as well as in the sub-tuberculate surface of its prothorax and elytra, the spurless tibiæ,*

* In the genus *Anœdus*, the tibiæ, contrary to the statement of Lacordaire, are all visibly spurred.

the head shortened behind the eyes, and some other minor points, it considerably approaches the genus *Phymatodes*,* and must, I think, be considered as a link connecting the two sub-families. The antennæ in this species have the second joint *very strongly* transverse; the terminal robust, ovoid, and not, as in *Phymatodes*, elongate and sub-cylindrical; the prothorax, moreover, and the form of the labium and the maxillary palpi are different from that genus, and more closely resemble the corresponding parts in *Goniadera*.

The *Goniadera cariosa* (Dej. Cat.), judging from an example so named in the Lafertéan collection, has the penultimate joint of the tarsi as strongly expanded beneath the claw joint as in the genera *Anœdus* and *Lyprops*, and should form the type of a distinct genus † of the sub-family *Heterotarsinæ*; the whole group, however, yet requires a very careful study on a large number of species, when, probably, it will be found necessary to erect the species just described into a distinct genus.

Another new genus, or sub-genus, will be an insect recently received from Mr. Hauxwell from Pebas, in Peru: it is very closely allied to *Phymatodes* (having quite a similar habit), but is at once separable by the remarkable form of the antennæ, which are shorter and stouter, the joints becoming gradually shorter and wider; 6-10 are *strongly transverse*; 11 large (but shorter than in *Phymatodes*), and strongly bent or arched; 3, 4, 5 are flattened on the under side, and 6-10 are not only thus flattened, but are concave, or *very broadly channelled* along their length, beneath. Only a single example, a ♂, of this insect has been received (I have seen another

* In which, also, the penultimate joint of the tarsi only *approaches* the sub-bilobed form, and cannot be considered as at all *expanded* beneath the claw joint. Mr. Pascoe has proposed (Journ. Linn. Soc., Zool. ix. 142, n.) the name *Phymatestes*, in lieu of *Phymatodes*, the latter having been pre-occupied.

† Readily distinguishable from *Phymatodes* (irrespective of its much smaller size and different habit) by the character already mentioned, and by its remarkably slender labial palpi; the second joint of the maxillary elongate, slender, and curved at the base; and by its spurred tibiæ:—from *Phobelius* by the latter character, and by its simple hind thighs:—from *Anœdus* by the base of its prothorax being squarely truncate, with the angles simple, and by its jet-black, shining, deeply crenate-striate elytra:—and from *Lyprops* (*Oligorus*, Dej. Cat.) by this last character, as well as by its transverse prothorax, and short broad elytra. I propose to name the genus *Æmymone*, and purpose soon to describe it in detail.

species, collected by my brother on the Amazons), which I propose soon to describe under the name of *Gamaxus Hauxwellii*.

ÆDIATORIX, n. g. (Pl. XV. fig. 4).

Closely related to *Goniadera*, from which it differs in having the *mentum** shorter, wider, and cordiform; the *labium* shorter and broader, with the anterior angles more strongly rounded; the *maxillary palpi* shorter and stouter, with the second joint broadly and very obliquely truncate and somewhat angular within, the third slightly arcuate and angularly produced at the apex within; *head*, behind the eyes, broader and *squarer*; *epistoma* longer, decidedly and broadly emarginate in front, and but little thickened; *antennæ* shorter (not attaining the length of the prothorax), stouter, the joints becoming very gradually wider as they approach the extremity; last joint very robust, and broadly rounded at the apex; *prothorax* decidedly longer than broad; squarely truncate at each extremity; moderately rounded at the sides, which are somewhat sharply crenulate at their edges; a little contracted in front and behind; the fore angles forming nearly right angles, the hind obliquely truncate; *elytra* much flatter, and consequently less declivous behind, less expanded behind the middle, a little more rounded at the shoulders, much less sinuous at the lateral margins; *epipleural fold* sub-horizontal; *prosternal process* terminating behind in a small triangular point; fore and hind thighs somewhat strongly incrassate, the former with a small oblique tooth near the base; the latter with a broad triangular tooth near the apex; intermediate thighs compressed, expanding from the base, with a broad blunt tooth near the extremity; all the tibiæ compressed and angular, without visible spurs; the anterior arched and acutely produced at the apex within; the intermediate strongly curved at the base, then expanded, and somewhat sinuous, to the extremity; the posterior so sharply and strongly curved, or bent, at the base that they might be said to be *hooked*, then expanded and sinuous to the apex, with an irregular row of sharp

* In all the species of *Goniadera* examined by me, the *mentum* is convex, a little longer than wide, broadly emarginate in front, the fore angles somewhat rounded, the sides strongly rounded anteriorly, and very strongly contracted at the base; and not, by any means, "quadrangulaire ou trapéziforme et tronqué en avant," as given by M. Lacordaire.

teeth along their inner side; first joint of the posterior tarsi much shorter, relatively, than in *Goniadera*. The abdomen is wanting in the only example I possess of this insect; but, judging from the notch in the posterior margin of the metasternum, the *intercoxal process* would be short, broad, and rounded in front, as in *Goniadera*.

This insect must be somewhat related to the species from Java mentioned by M. Lacordaire in his "Genera," vol. v. p. 392 note, which that author says is a *true Goniadera;* our insect, however, is abundantly distinct from that genus in its differently formed head, antennæ, and prothorax; in its much flatter elytra, with the epipleural fold sub-horizontal; and in its peculiarly constructed legs. In the form of its maxillary palpi *Ædiatoriæ* very nearly approaches the genus *Phymatodes*.

Ædiatoriæ Jansoni, n. sp. (Pl. XV. fig. 4).

Length 8½ lines:—elongate, depressed; upper surface, antennæ, and legs uniformly dark-brown; opaque; more or less coated with, apparently, a gummy substance, probably derived from its living in decomposed woody matter; underside, as much of it as is left exposed, deep black, glossy: epistoma pitchy-red, closely and coarsely punctured: head and prothorax strongly, coarsely, and somewhat reticulately corrugate; on the latter, the elevated portions are, here and there, highly polished; scutellum elongate, sinuous at the sides, pointed behind, and with a few large coarse punctures on the disc, the margins being smooth and polished; on each elytron are four very fine, sharp, smooth costæ or ridges; the first and fourth uniting near the apex of the elytra, the second abbreviated behind, the fourth abbreviated in front, the third mounting to, and turning, the shoulders, and nearly joining the first and fourth at their junction, near the hind extremity of the elytra; there is also another ridge, short and oblique, at each side of the scutellum; the intervals are broad, flat, or slightly concave; finely shagreened with minute granules, and studded with small punctures, somewhat irregularly arranged in three rows on each interval; suture elevated, smooth; epipleural fold, parapleuræ, and sides of sterna minutely granulose, and with a few scattered punctures, the first-mentioned being punctured only at the base, and by a single row down by the outer margin; legs

and antennæ covered with large, rounded or oblong impressions, the narrow elevated lines dividing them giving to the whole surface a somewhat cellulose appearance; the antennæ hispid.

Hab.—Java.

I dedicate this remarkable insect to my friend E. W. Janson, Esq.

Fam. CISTELIDÆ.

Gen. Chromomæa.

Pascoe, Journ. Ent. ii. p. 490.

With reference to the note, *ante*, p. 272, I may remark that the genus *Licymnius* is quite distinct from *Chromomœa*. I doubt whether the specimen of *Licymnius foveicollis*, from which the description at pp. 271, 272, was drawn, is a male; and must wait for other specimens before I can decide this point.

1. *Chromomœa Pascoei*, n. sp.

♂. Length 3¼ lines; pubescent; labrum, base and tip of mandibles, head, prothorax, scutellum, and elytra deep shining black; the elytra with a longitudinal yellow stripe, which, curving inwards from the shoulders, becomes gradually attenuated behind, and dies out before reaching the apex; eyes prominent; head rather strongly, and somewhat rugosely, punctured; labrum sparingly punctured, and with a few long hairs; prothorax elongate, sub-cylindrical, scarcely narrowed in front, hind angles narrowly rounded; somewhat depressed above, finely and closely punctured; with the usual large fovea on the middle of the base, within the margin; and another, obscure and smaller, at each side; scutellum large, transverse, punctured, broadly rounded behind; elytra half as wide again as the prothorax at the base, which is bisinuate; flattened above, rounded at the shoulders, and, from thence, gradually tapered to the apex, which is narrowly rounded; punctate-striate: the punctures not approximate; save the sutural one, which is very strongly impressed, these striæ are abbreviated behind, and gradually die out as they approach the sides of the elytra; the intervals, save the two nearest the suture,

are flat, and finely but not closely punctured; lateral margins reflexed; underside deep shining black, finely punctured, pubescent; legs yellow, with the apical half of all the thighs, and the base and apex of all the tibiæ, black; palpi, and three first joints (save the tip of the third) of the antennæ, reddish; tips of the former dusky, remaining joints of the latter black; tarsi dusky red.

The hind thighs are strongly compressed, and are expanded in the middle within, into a very broad blunt tooth; the tibiæ are all strongly keeled externally, the anterior feebly sinuous, the posterior very strongly sinuous or twisted, completely excavated or channelled, on their inner side, from near their base, and expanded in the middle; these characters, together with the more projecting eyes, the smaller and narrower form, brighter colours, sparser pubescence, and the elytra gradually attenuated behind, are the distinguishing features of the males in this genus.

The present species may be at once separated from *C. picta* (Pascoe, Journ. Ent. ii. 491) by its smaller size, more prominent eyes, squarer prothorax, finer punctuation, and differently coloured labrum, antennæ, legs, and elytra.

Hab.—Australia (Brisbane).

I have great pleasure in dedicating this handsome little species to my friend F. P. Pascoe, Esq.

2. *Chromomœa vittata*, n. sp.

♂. Length $3\frac{3}{4}$ lines:—very similar in colour, markings, &c., to the preceding, but the black of the prothorax and elytra is somewhat dusky, and with a slight greenish tinge; it is also a little larger; the eyes are less prominent, the head broader, the prothorax shorter, broader, rounded at the sides, decidedly narrowed anteriorly, the hind angles more strongly rounded, and the punctuation of the whole insect, both above and on the underside, is coarser.

The ♀ is more pubescent than the ♂; the black of the prothorax and elytra of a duskier hue, and with a more decided greenish tinge; the eyes less prominent; the elytra broader, and gradually expanding to the middle, with the yellow stripe broader and extending nearer to the apex; the tibiæ are keeled only at the

base, the fore and intermediate straight, the hind a little arched only, not sinuous, nor channelled down their inner side; and the hind thighs are simple.

Hab.—New South Wales, and Brisbane.

It is possible that this species may, ultimately, have to be united to the preceding; but the differently formed prothorax, alike in both sexes, at present compels me to hold them distinct.

3. *Chromomœa pallida*, n. sp.

♂. Length 3½ lines:—finely pubescent; slightly shining; elytra pale greenish-yellow, with the sutural region, sides and epipleuræ, rufescent; head, save the epistoma which is dark red, and labrum, deep black; prothorax, including the flanks, bright reddish-castaneous, with an obscure irregular fuscous patch on the disc; head somewhat coarsely and rugosely punctured; prothorax longer than wide; sides sub-parallel, a little narrowed anteriorly; hind angles very slightly rounded; very finely and closely punctured; scutellum rufescent, large, strongly transverse, very broadly rounded behind; elytra scarcely half as wide again as the prothorax at the base, strongly rounded at the shoulders, punctate-striate, the punctures somewhat approximate; the striæ more apparent on the sides and at the apex than in the two preceding species: intervals sub-convex on the disc, finely and rather closely punctured; underside glossy; sterna black, minutely and rugosely punctate; parapleuræ dull red; abdomen, save the two basal joints which are more or less pitchy, bright red; very minutely punctulate; palpi, mandibles (except the tips, which are black), and antennæ, pale red, the terminal joints of the latter being more or less dusky black; legs pale yellow, with a patch near the apex of the thighs, the base and apex of the tibiæ, and the tarsi, dusky black.

The ♀ is larger, 4 lines, of a duller colour above; parapleuræ of a bright red, and the abdomen entirely red.

Hab.—New South Wales.

At once to be distinguished from the preceding by its black head, contrasted with its red prothorax, differently coloured elytra, and bright red abdomen.

4. *Chromomœa rufescens*, n. sp.

♀. Length $4\frac{3}{4}$ lines:—shining; sparingly clothed with a very short, fine pubescence; labrum black; head and prothorax (flanks included) dark castaneous, with an obscure line down the centre, and a marginal patch at each side, black; elytra reddish-brown, with the apex more or less dusky-black; head strongly and rugosely punctured; prothorax a little longer than wide, sides sub-parallel, slightly narrowed in front; closely and rather finely punctured, at each side of the usual basal fovea is a small narrow elongate depression, close to the hind margin; hind angles narrowly rounded; scutellum transverse, broadly rounded behind; elytra rather broad, depressed; punctate-striate, the striæ a little fainter at the sides, base, and apex; intervals sub-convex, punctured, and more or less transversely wrinkled; body beneath, save the metasternum which is partly of a bright red, black; finely pubescent, very glossy; middle joints of abdomen bright red, remainder pitchy; antennæ red, the three basal joints being paler; basal half of thighs, and the tibiæ, yellowish-brown; tips of the latter, and apical half of the former, red; their tips, and the tarsi, darker.

The terminal joint of the antennæ is smaller than the preceding, and is somewhat acutely pointed at the apex.

In the two female examples of this species before me, one has the head darker, the prothorax more obscured by dusky patches, and more depressed, the sides more parallel and less contracted in front, and the basal callosities of the elytra much less pronounced, than in the other. I do not know the male. The larger size, and nearly uniform reddish-brown colour, will serve to distinguish this species from any of the foregoing.

Hab.—New South Wales.

5. *Chromomœa unicolor*, n. sp.

♀. Length $3\frac{1}{4}$ lines:—entirely black, with a slight brassy tinge; shining; clothed with a rather long ashy pubescence; somewhat strongly depressed; head rather narrow, strongly punctured; the punctures, behind the eyes, elongate; prothorax a little longer than broad; sides sub-parallel, slightly contracted anteriorly; hind angles scarcely, or very narrowly, rounded; strongly punctured, the punctures large and rounded;

scutellum broadly rounded behind, punctured; elytra strongly bisinuate at the base; with a somewhat deep depression behind the basal callosities; punctate-striate, the punctures rather large; very strongly and transversely wrinkled, and irregularly punctured, on the intervals; underside black without any brassy tinge; densely pubescent; densely and strongly punctured; abdomen closely and transversely rugose-punctate; organs of the mouth, and legs, pitchy black; the tarsi a little paler; antennæ, save the second joint which is red, black.

Hab.—South Australia.

I have not seen the male of this species, which is very distinct from all the others by its colour, and the strongly wrinkled surface of its elytra.

Fam. LAGRIIDÆ.

Xenostethus, n. g. (Pl. XV. fig. 5).

Male:—*sub-mentum* pedunculate* (*i. e.* rising considerably above the level of the bottom of the maxillary sinus), broadly arched in front; *mentum* strongly transverse, convex, arcuately emarginate in front, fore angles somewhat pointed, sides rounded before the middle, thence contracted to the base; sparsely clothed with a few long suberect hairs; *labium* very prominent, transverse, its paraglossæ (?) enormously developed (overlapping the ligula, which they nearly conceal), more or less closely united at their inner margins, and forming, thus conjoined, a transverse sub-triangular body, its sides incurved with the margins broadly reflexed, its apex more or less pointed and furnished with a tuft of hairs; the ligula being visible only at the base and through a narrow triangular cleft in the junction of the paraglossæ (?) behind; *labial palpi* short, somewhat robust; last joint short, strongly curved outwardly, the apex broadly and somewhat obliquely truncate; inner lobe of *maxilla* rather small, foliaceous, clothed with longish hairs; the outer lobe masked by a large plate, which is oblique, of an oblong form, broad and rounded

* M. Lacordaire in his definition of the family, says:—"Menton non porté par un pédoncule du sous-menton;" this is certainly an error, for, in the whole of the genera, the sub-mentum is more or less pedunculate; in the genus *Statira* it is even more strongly so than in *Xenostethus*.

in front, and gradually tapering behind;* *maxillary palpi* very long, hairy, last joint elongate, cultriform; *mandibles* thin, rather strongly curved near their extremity; bifid at the end, the prongs of unequal length, sharp and pointed; *labrum* transverse, strongly notched in front, fore angles broadly rounded, thence rather sharply contracted to the base; attached to the epistoma by a semicorneous hinge; *head* rounded behind the eyes, then suddenly contracted into a rather long cylindrical neck; *cheeks* prominent; *epistoma* short, broadly truncate and sub-sinuous in front, sides sub-parallel, or slightly widening behind, separated from the front by a well-marked transverse impression; *eyes* large, prominent, transverse, approximate above, narrowed below, hind margins sinuous, slightly notched in front for the reception of the antennary auricles (= "oreillettes antennaires," Lacord.), the latter small and narrow (leaving the globular roots of the antennæ exposed) but very prominent; *antennæ* long, slender; joint 1 elongate, thickening to the extremity; 2 short; 3 more than twice the length of 2, and, like it, a little swollen at the end; 4-10 elongate, sub-equal, sub-cylindrical, or slightly thickened at their extremity; 11 more than twice the length of 10, cylindrical, the apex pointed; joints 1-3 are smooth and nearly hairless, the remainder are minutely rugose-punctate, and more or less clothed with short decumbent hairs: *prothorax* globoso-oval, its pronotum confounded with its flanks, but with all the angles apparent, distant from the elytra, notably prolonged behind the insertion of the anterior coxæ; faintly bisinuate and finely margined in front; constricted behind near the base, which becomes suddenly and obliquely widened, hind margin somewhat thickened or raised, and strongly bisinuate; *scutellum* elongate, narrow, sinuous at the sides; entire, and gradually arched, behind; *elytra* elongate, narrow, sub-cylindrical; half as wide again as the prothorax at the base, which is truncate; sub-parallel, the shoulders distinct, rounded; contracted near the hind extremity, with the apex rounded, or obliquely truncate, and with a small spine or tooth at the sutural angle; *epipleural fold* narrow, sinuous, a little expanded

* What appears to be the *lobe proper* (densely clothed with short hairs at its summit) is found soldered to the under surface of this plate, and is more or less enfolded by an inner expansion of it; no mere description, however, can convey a correct idea of the curious oral organs of this insect; the details given on the plate, where they are shown *in situ*, and dissected out, on both their faces, will best illustrate them.

near the base, gradually narrowing towards the extremity of the elytra behind; *legs* long; the three pairs nearly equidistant (in consequence of the prolongation of the prothorax behind its acetabula); fore and hind thighs very strongly incrassate, the former curved, and with a broad blunt tooth near their extremity within; tibiæ of the same pairs rather strongly arched, expanded, broadly excavated, and partly fringed with long hairs within; the anterior are also thickened at their extremity; intermediate thighs comparatively slender, slightly thickening from their base to near their extremity; the intermediate tibiæ are a little curved, and slightly excavated within, at their basal half; the hind and intermediate tibiæ are also armed with a short curved spur; tarsi furnished with a brush of short hairs beneath, and with a few longer hairs on their sides and above; the penultimate joint of all sub-bilobate; the first of the posterior nearly as long the following united; fore and intermediate coxæ more or less clothed with long shaggy hairs; the posterior transverse, oblique; the anterior moderately long, somewhat narrowly separated by the prosternal process; *prosternum* broadly concave in front, its *process* between the coxæ is narrow, very prominent, canaliculate, with the margin, at each side, raised into a long obtuse tooth; it is abruptly bent down behind the coxæ, then suddenly widened, plain, the hind extremity more or less strongly hooked, the apex being obtusely pointed; *mesosternum* horizontal, broadly hollowed out in front in form of an open V; *metasternum* elongate, its episterna sub-parallel, sinuous at the sides; *intercoxal process* long, narrowly triangular, the apex pointed; *abdomen* 5-jointed, the last joint arcuately truncate at each side at the apex, leaving a short broad triangular projection in the centre; *body* winged.

Female:—differs from the male in having the *eyes* a little less prominent, less approximate above; the *prothorax* shorter, less globose, broader in front and behind; the *scutellum* not sinuous at the sides, and notched behind; the *elytra* not so parallel, a little expanded behind the middle, the apex pointed (but still having the tooth at the sutural angle, as in the ♂); the *epipleural fold* broadly continued to the hind extremity: the fore and hind thighs straight, less strongly incrassate, simple; the tibiæ (of the same pairs) sinuous, not arched, and neither expanded nor excavated within; intermediate

tibiæ straight, entire; the first joint of the posterior tarsi a little less elongate; the fore and intermediate coxæ smooth, or with but a few short inconspicuous hairs; the *prosternal process* not toothed at each side between the coxæ, nor hooked at the hind extremity; the abdomen 5-jointed as in the ♂, the last joint is not truncate, but has a small semicircular notch at its extreme apex.

The antennæ are imperfect in all the female examples I have of this insect; but judging from the portion remaining, I should say they do not materially differ from the ♂, unless, it may be, in the terminal joint.

The submentum (="pièce prébasalaire" of Du Val, Gen. des Coléop. Introd.) is well defined in this genus, being marked out from the rest of the undersurface of the head by a deeply impressed line or suture. I cannot find any trace of spurs to the anterior tibiæ in either sex.

Of the genera yet published *Xenostethus* is most nearly related to *Statira*, with which it has many points of structure in common; but in the peculiar form of its oral organs, and in the remarkable prolongation of the prothorax behind the acetabula, it cannot, so far as my knowledge extends, claim relationship with any other described genus of *Heteromera*. The marked protuberance of the anterior coxæ and parts adjacent, with their acetabula broadly closed behind; the elongate terminal joint of the antennæ; the head contracted behind into a long neck; and the form of the tarsi, are the chief characters which lead me to place the genus, provisionally at least, in the family *Lagriidæ;* ultimately, perhaps, its many special peculiarities may be considered of sufficient value to entitle it to rank in a less subordinate position; the family, however, already contains some very peculiar forms.

Xenostethus Lacordairii, n. sp. (Pl. XV. fig. 5).

♂. Length 7¾-8½ lines:—elongate; narrow; shining; elytra clear bright green, or olive green, sometimes with the sides purplish coppery; *head* and prothorax deep shining black; the former more or less convex and smooth on the crown; front flattened or depressed, uneven, sparingly punctured; epistoma and labrum smooth, the latter having some long hairs above and fringing the

anterior border; mentum coarsely rugose-punctate; a few large rounded punctures behind the eyes and on the cheeks; neck finely and sparingly punctured; *prothorax*, including the flanks, strongly punctured, the punctures large and rounded, more sparingly distributed on the disc, more crowded on the sides; longer than broad, very convex or globose; strongly rounded on the sides to the constriction behind, thence rapidly expanding to the hind angles; not impressed down the median line; an oblong fovea or depression on the middle of the base, within the margin; *scutellum* black, smooth; *elytra* elongate, sides nearly parallel, and feebly sinuous; punctate-striate; the punctures rather large, deep, rounded and approximate; the intervals convex and smooth; meso- and meta-pleuræ and sides of metasternum punctured, the punctures large and rounded: metasternum strongly depressed in the middle, and, together with the abdomen, transversely wrinkled and sparsely clothed with long hairs: body beneath, legs, palpi, labrum, and three first joints of antennæ pitchy-black, shining; remaining joints of the latter reddish-brown.

♀. Length 7¼ — 8 lines:—differs from the ♂ in having the head more densely and coarsely punctured behind the eyes: the prothorax shorter, less convex, less rounded at the sides, wider in front and behind, faintly impressed down the median line, without the depression in the middle of the base; elytra less parallel at the sides, a little expanded behind the middle: metasternum and abdomen smooth, not transversely wrinkled, and hairless; the former convex, not depressed in the middle.

Hab.—Sherboro Island: West Coast of Africa.

I dedicate this most peculiar insect to the illustrious author of the "Genera des Coléoptères."

Family RHIPIPHORIDÆ.

Gen. Acosmus.

(Dej. Cat. p. 239); Lacord. Genera, v. p. 625, note.

Judging from an example in the Lafertéan Collection labelled "*Acosmus capensis*, Dej.," this species is certainly identical with the *Geoscopus murinus*, Gerstäck. Monog. Rhipiphor. pp. 7, 8, plate, fig. 2. a. b. c.

Explanation of Plate XV.

Fig. 1. *Aryenis rufescens*, (*a*, *b*).

2. *Chorasmius procerus*, (*a*).

3. *Goniadera interrupta*, (*a*, *b*, *c*).

4. *Ædiatorix Jansoni*, (*a*, *b*, *c*).

5. *Xenostethus Lacordairii*, ♂; (*a*, antenna; *b*, head, underside; *c*, mentum, labium, &c.; *d*, back view of paraglossæ ?; *e*, inner face of maxilla, &c.; *f*, outer face of maxilla, &c.; *g*, last abdominal joint in ♀; *h*, last abdominal joint in ♂).

6. *Goniadera repanda*, (*a*, *b*, *c*,).

7. *Goniadera*, sp., (*a*, *b*, *c*).

8. *Phymatodes tuberculatus*, ♀. (*a*, *b*, *c*).

9. *Phymatodes*, sp., ♂, (*a*, *b*, *c*).

Additional Explanation of Plate XII.

The following figures were added to this Plate after the explanation (*ante*, p. 274) was printed:—

Fig. 1*. *Hypaulax marginata*, head and prothorax, upperside; 1e*, underside. (*Ante*, p. 261.)

8. *Dechius scissicollis*, ♂ ?. (*Ante*, p. 266.)

8*. *Dechius scissicollis*, hind tibia, enlarged.

XVIII. *Descriptions of New Genera and Species of Exotic* Hymenoptera. By J. O. Westwood, M.A., F.L.S., &c.

[Read 16th November and 7th December, 1868.]

Genus Trigonalys, Westw.

1. *Trigonalys pulchella*, n. sp.

Minuta; castanea, flavo et nigro variegata; alis limpidis, nubila fuscescente subapicali; antennis obscure fulvis.

Long. corp. lin. $3\frac{1}{2}$; expans. alar. lin. $6\frac{1}{2}$.

Habitat in Insula Ceylon. Dom. Thwaites. In Mus. Hopeiano, Oxoniæ (olim nostro).

Species perelegans. Caput castaneum, clypeo, orbitu oculorum, maculis tribus verticalibus lineolisque nonnullis posticis flavis. Thorax castaneus; marginibus superis collaris, maculis duabus conicis anticis mesonoti, alteris duabus ad latera scutelli, post-scutelli linea tenui transversa, maculisque duabus magnis posticis metanoti, flavis. Abdomen segmentis dorsalibus basi nigris, apice castaneis, 1mo et 2do macula magna communi ovata, hujus etiam margine lato postico, flavis; segmentis apicalibus flavis, linea longitudinali media castanea; segmentis ventralibus inermibus.

2. *Trigonalys jucunda*, n. sp.

Rufo-fusco et flavo varia, minute punctatissima; alis hyalinis, anticarum dimidio costali fusco; pedibus rufis, tibiis basi albidis; antennis fuscis, basi fulvis.

Long. corp. lin. $4\frac{1}{2}$; expans. alar. antic. lin. 10.

Habitat in Amazonia. Dom. Bates. In Mus. Hopeiano, Oxoniæ.

Caput flavum, vertice late castaneo, nigro cincto; antennæ longæ, 24-articulatæ, apice gracillimæ, articulis 8 basalibus fulvo-rufis, apice fuscæ. Thorax castaneo-rufus; collaris lateribus, maculis duabus anticis mesonoti, alteris duabus ad basin scutelli, post-scutello, et maculis duabus ad apicem metanoti, flavis; scutello nigricante. Abdomen ad basin castaneum, ad apicem nigricans, segmentorum margine apicali flavo, segmentis ventralibus in medio inermibus.

3. *Trigonalys lugubris*, n. sp.

Nigra, punctatissima, flavo varia; alis anticis margine costali fusco suffuso.

Long. corp. lin. $4\frac{1}{2}$; expans. alar. antic. lin. 9.

Habitat in Amazonia. Dom. Bates. In Mus. Hopeiano, Oxoniæ.

Caput nigrum; clypeo, macula parva ad marginem anticum oculorum, alterisque duabus suborbitalibus, mandibulisque flavis, harum dentibus nigris; antennæ nigræ, 27-articulatæ. Thorax niger, collaris margine supero, punctis duobus anticis mesonoti, alterisque duobus minutis ad latera scutelli, post-scutelli linea tenui in medio emarginata, flavis. Abdomen segmentis postice flavo tenue marginatis; infra in medio profunde incisis. Alæ hyalinæ, margine costali fusco pone stigma magis suffuso. Pedes nigri, tibiis extus albidis.

NOMADIÑA, n. g.

Genus novum, e sectione *Terebrantium; Trigonalydi* proximum, *Nomadam* (*Apidum*) quodammodo simulans.

Corpus breve robustum. Caput transversum, lobo transverso antico, in quo insident antennæ, thorace breviores, sat crassæ, 16-articulatæ, articulo 1mo brevi. Ocelli 3, parvi; mandibulæ latæ, subquadratæ, fere planæ, 4-dentatæ; reliquæ oris partes fere obsoletæ; palpi labiales brevissimi, subconici. Thorax ovatus, collari supra inconspicuo. Pedes breves, robusti, simplices, unguibus bifidis. Alæ anticæ cellula una marginali, 4 submarginalibus; 1ma magna accepit venam 1am recurrentem, 2da parva trigona, 3tia parva quadrata accepit venam 2dam recurrentem; cellulis 3 discoidalibus. Abdomen thorace paullo majus, depressum, sub-spatulatum; segmento 3tio ventrali in tuberculo medio conico elevato, 4to inciso.

Nomadina Smithii, n. sp.

Lutea, fusco varia; capite maculis 4 parvis inter et pone oculos; thorace linea media ad post-scutellum extensa, maculisque duabus oblongis mesothoracis, fuscis; margine postico segmentorum abdominalium albido; alis concoloribus, stigmate venisque castaneis.

Long. corp. lin 5; expans. alar. antic. lin. $10\frac{1}{2}$.

Habitat in Amazonia. Dom. Bates. In Mus. Smith.

Sibyllina, n. g.

Genus novum *Aculeatorum*, quoad affinitates animum excrucians, sed ad familiam *Vespidarum* ut mihi videtur magis approximans. Corpus elongatum, *Belonogastri* (*Vespidarum*) vel *Pelopœi* (*Sphegidarum*) habitu, ♂ etiam *Formicarum* nonnullarum antennis elongatis, non dissimile.

Caput mediocre. Oculi reniformes. Ocelli magni. Mandibulæ parvæ, 3-dentatæ. Antennæ ♀ graciles, filiformes, alis longiores, 12-articulatæ, non geniculatæ, articulo 1mo parvo. Palpi valde elongati, 6-4-articulati. Labium, ut videtur, 3-lobatum. Thorax elongato-ovatus, collare brevi, lateraliter ad tegulas extenso, in medio subtus profunde impresso. Petiolus abdominis thorace longior. Abdomen elongato-ovatum. Pedes longi, graciles, haud spinoso-denticulati; tarsis omnibus elongatis, membranaceo-dilatatis; unguibus dente medio subtus armatis. Alæ mediocres; anticæ haud longitudinaliter plicatæ; cellula una marginali, 3 submarginalibus, 1ma et 2da æqualibus, 2da accepit venam 1am recurrentem valde obliquam in medio marginis postici; 2da recurrente, valde indistincta, cellulam 3am discoidalem claudente, transversa, et apicem cellulæ 2dæ attingente; alæ posticæ ad apicem venæ pobrachialis incisæ.

Sibyllina ænigmatica, n. sp.

Tota luteo-fulva; lævis, vix nitida; alis lutescente vix tinctis. *Ophioni luteo* coloribus similis.

Long. corp. unc. $\frac{1}{2}$; expans. alar. antic. unc. $\frac{3}{4}$.

Habitat in Insula St. Dominici, Hayti. Dom. Tweedy. In Mus. Hopeiano, Oxoniæ; Britann.; et Dom. Smith.

Genus Aulacus, Jurine.

The following descriptions of new species are supplemental to those published by me in the Third Volume of the First Series of these Transactions (p. 260), and the First Volume of the Second Series (p. 222).

1. *Aulacus nobilis*, n. sp.

Niger, nitidus; mesonoto valde gibboso, retuso, rugoso, et antice tuberculis duobus conicis porrectis armato,

supra rufo-fulvo; alis fuscis, violaceo-micantibus, stigmate nigro, omnibus macula trigona, paullo ante medium, fasciaque lata substigmatico, hyalinis. Abdomine brevi clavato; oviductu abdomine paullo longiori, valvulis nigris. ♀.

Long. corp. lin. 6; expans. alar. lin. 11.

Habitat in Amazonia. (Dom. Bates). In Mus. Hopeiano, Oxoniæ.

2. *Aulacus formosus*, n. sp.

Elongatus, læte flavus, nigro variegatus; alis subhyalinis, stigmate nigro, nubilaque apicali anticarum infumatis; capitis vertice nigro, lineis (vel punctis) duabus flavis; mesonoto transverse striatulo, macula trigona antica, alterisque duabus dorsalibus, scutello et metanoto maculis parvis nigris notatis; abdomine flavo, basi et fasciis nigris; pedibus flavis, posticorum duorum trochanteribus, basi et apice tibiarum, tarsisque nigris: oviductus valvulis nigris. ♂ et ♀.

Long. corp., ♂ lin. 6; ♀ lin. 7; expans. alar. antic., ♂ lin. 12; ♀ lin. 14.

Habitat in Australia australiori (Melbourne, Dom. Bakewell).

In Muss. Hopeiano, Oxoniæ (olim nostro) et Britann. (cum nomine M.S. Smithiano supra usitato inscriptus).

3. *Aulacus stigmaticus*, n. sp.

Niger; capite antice et lateribus thoracis griseo sericantibus; abdomine longo, compresso; pedunculo fere dimidium longitudinis abdominis æquante nigro, segmentis 2 proximis obscure fulvis, dorso nigro-fasciatis; alis hyalinis, anticis costa flavescente, macula magna rotundata nigra cum stigmate connexa; antennis nigris, articulis 2 basalibus fulvis: pedibus obscure luteo-albidis, posticis duobus obscurioribus: venis alarum posticarum fere obsoletis. ♂.

Long. corp. lin. $5\frac{1}{2}$; expans. alar. antic. lin. $8\frac{1}{2}$.

Habitat apud Singapore. (Dom. Wallace). In Mus. Smith.

4. *Aulacus rufitarsis*, n. sp.

Niger, capite subopaco, thorace striolato; abdomine subelongato, nitido, sensim subclavato: antennis et palpis

nigris: alis obscure hyalinis, stigmate nigro, apice fuscescente, vena cellulam 2am submarginalem claudente fere obliterata; pedibus nigris, tibiis quatuor anticis tarsisque omnibus rufescentibus; oviductu abdomine plus dimidio longiori, valvulis nigris. ♀.

Long. corp. lin. 6; expans. alar. antic. lin. 11.

Habitat in Terra Van Diemenii. (Dom. Cuming). In Mus. Hopeiano, Oxoniæ.

5. *Aulacus hæmorrhoidellus*, n. sp.

A. hæmorrhoidali (Westw. Tr. Ent. Soc. ser. 2, i. 223) magnitudine et habitu simillimus. Differt spina parva porrecta utrinque ad angulum antico-inferum collaris, pedibus nigris, et oviductus valvulis late albo-fasciatis. ♀.

Long. corp. lin. 6; expans. alar. antic. lin. 9½.

Habitat in Amazonia. (Dom. Bates). In Mus. Hopeiano, Oxoniæ.

6. *Aulacus spinifer*, n. s.

A. hæmorrhoidali proximus. Differt antennis omnino nigris; mesonoto supra obscure testaceo, areolato, antice bicornuto; margine antico angusto nigro collaris etiam spinis 4 antice porrectis armato: scutello et metanoto nigris, rugosis: abdomine clavato, dimidio apicali testaceo: alis hyalinis, stigmate nigro, nubila apicali fuscescente; oviductus valvulis nigris; pedibus 4 anticis luteis, tarsis apice obscuris, 2 posticis nigris.

Long. corp. lin. 6½; expans. alar. antic. lin. 8½.

Habitat in Amazonia. (Dom. Bates). In Mus. Hopeiano, Oxoniæ.

(*Aulacinus*, subg. nov.)

7. *Aulacus* (*Aulacinus*) *mœrens*, n. sp.

Brevis, subopacus; niger; capite subgloboso, antennis brevibus, fulvis, articulis 2 basalibus et 2 apicalibus nigricantibus; thorace brevi-ovato, antice subretuso, striatulo; alis subhyalinis, stigmate et venis nigris, cellulis 4 submarginalibus distinctis, 2da late trigona, apice supra truncato, 3tia subquadrata, vena cellulam 2dam claudente

cum vena secunda recurrente continua; venis alarum posticarum obsoletis; pedibus nigris, tibiis (nisi apice posticarum) tarsisque brunneis: abdomine brevi, clavato; oviductu abdomine breviori; valvulis nigris. ♀.

Long. corp. lin. $5\frac{1}{2}$; expans. alar. antic. lin. $8\frac{1}{2}$.

Habitat apud Adelaidam, Australiæ. In Mus. Hopeiano, Oxoniæ.

The variation in the veins of the wings has rendered it necessary to propose a separate subgenus for this species.

APR 3, 1963

THE

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON

FOR THE YEAR

1868.

February 3, 1868.

H. W. Bates, Esq., F.Z.S., President, in the chair.

The President, after thanking the Society for the honour conferred upon him by his election to the chair, nominated as Vice-Presidents, Sir John Lubbock, Mr. W. Wilson Saunders, and Mr. Stainton.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' Nos. 93—97; presented by the Society. 'Abhandlungen herausgegeben vom naturwiss. Vereine zu Bremen,' vol. i. part 2; by the Society. 'Coleoptera Hesperidum, being an Enumeration of the Coleopterous Insects of the Cape Verde Archipelago,' by T. V. Wollaston; by the Author. Newman's 'British Moths,' No. 14; by the Author. 'The Zoologist' for February; by the Editor. 'The Entomologist's Monthly Magazine' for February; by the Editors.

Exhibitions, &c.

Mr. Bond exhibited a female specimen of Drilus flavescens, the second specimen of that sex, he believed, which had been found in this country. On the 1st of April, 1867, Mr. J. E. Harting was collecting shells on the South Downs at Harting, Sussex, and the Drilus was discovered in a shell of Helix ericetorum. The larva has for some time been known to live in snail shells (see Proc. Ent. Soc. 1858, p. 9), and Mr. Bond suggested that the female had been hatched in the shell in which it was discovered, and had never quitted it until disturbed by Mr. Harting.

Mr. Bond exhibited larva-skins of a species of Dermestes, which he was at first informed had not only destroyed the bladder-coverings of sixty pots of preserved fruits, but had also eaten a considerable portion of the contents; but on further inquiry it turned out the larvæ had not in this case eaten any of the fruit, but merely damaged the surface, which was covered with larva-skins and "what appeared to be powder or small eggs." Mr. Newman, however, had informed Mr. Bond that a city house had recently sustained great loss from the same insect: in this instance the pots of jam were covered with paper only, not with skin, and the larvæ had actually consumed part of the contents, and rendered the whole worthless.

Mr. M'Lachlan had found quantities of a Dermestes larva in the timbers of a ship, upon which they had fed. Mr. F. Smith had reared Dermestes from timber; and Mr. Janson had often noticed that the larvæ would forsake hides and take refuge in the wooden flooring of a building, but this was probably for pupation, not for sustenance.

Mr. Daniel Hanbury communicated a letter from Dr. Bidie, of the Madras Army, respecting the "coffee-borer" of Southern India (see Proc. Ent. Soc. 1867, p. cix); and Mr. F. Smith mentioned that in Chevrolat's collection in the British Museum there was a single specimen, labelled Xylotrechus quadripes, which seemed to be identical with the insect recently received from India.

With reference to Mr. Stainton's larva of a Tinea found feeding in an antelope's horn (Proc. Ent. Soc. 1867, p. cv.), Mr. Bond mentioned that a similar case was recorded by Mr. Haliday in the Proc. Dublin Univ. Zool. Soc. 1855: see Dublin Nat. Hist. Review, vol. iii. p. 23, pl. i.

Mr. Bond also exhibited a specimen of Bombyx quercus, in which the colours of the male and female were combined.

Dr. Wallace exhibited two British-born specimens of the Japanese oak-feeding Bombyx Yamamai, one reared by Mr. Gascoyne at Newark, the other by Mr. Shoolbred at Wolverhampton; and some eggs laid by Mr. Gascoyne's specimen. Also specimens of Bombyx Pernyi, a Chinese oak-feeding species, which he hoped would be naturalized in this country. Also, an imago and cocoon of Pachypusa effusa from Graham's Town, an acacia-feeder, from which an attempt was being made in South Africa to obtain silk, though the nature of the cocoon gave little promise of a favourable result. Dr. Wallace made some observations on the progress of sericiculture, as well of mulberry silk as of Ailanthus silk, at the Cape of Good Hope and in Australia; and expressed his opinion that, although he found the air of the Eastern Counties of England too dry for Bombyx Yamamai, that species would probably succeed better in the cool and moist climates of Ireland or Scotland.

Dr. Gray communicated the following extract from a letter received by him from Dr. George Bennett, dated "Sydney, 21 October, 1867":—

"We have had, since the 14th of September, a wonderful flight of moths in Sydney and the vicinity, extending inland fourteen to twenty-five miles, and along the coast in clouds, from Newcastle seventy-five miles north, to Kiama eighty-eight miles south of Sydney: in those places they have swarmed in legions, proving a perfect pest. They are of the family Noctuidæ, and you may recollect that in my 'Wanderings in New South Wales' vol. i. p. 265, I mentioned a moth of the genus Agrotis, probably A. spina, which congregates in November, December and January, about masses of granite on the Bugong range of mountains. The moth of which this year we have such multitudes is, I consider, of the same genus as the Bugong, and is a large dark-coloured insect, very prettily marked; whether a new species I will leave you to determine: it is recognized by the colonists as a well-known visitor, but rarely in such multitudes and never to so wide an extent as during this time. Every house and public building is infested with them, clinging in swarms to the corners, behind shutters, or in any hollow space where they can congregate: this occurs to a greater extent in the suburbs than in the city. On the first morning following their arrival they occasioned great alarm and annoyance, for on opening the shutters the servants

were saluted by a copious shower of these strong-winged insects, which had crowded on every part of the rooms and verandah, flying in legions in their faces with a whirring noise, and at the same time covering them with a quantity of dust or moth-feathers. During the first few days of the plague, some persons had to call in the assistance of their neighbours to help to clear away the hosts of these insects that had congregated in their dwellings. They filled the church at Kiama, and for a time prevented the performance of divine service; and how they behaved in the church at St. Leonards, on the north shore of Port Jackson, has been described by the Rev. W. B. Clarke. It is difficult to form an opinion whence the moths came: on the doors and windows being left open, the rooms were soon filled with multitudes, and what with the "dust-feathers" and a white fluid ejected by them, they stained and injured the curtains and coverings of the furniture. About dusk they might be observed flying high and always with great rapidity, and then spreading about would alight on the flowers, always selecting the sweetest, and on these they might be seen in crowds sucking the blossoms, and so busily engaged as to be readily captured. Although generally seen about dusk, yet I observed a few days since a number of them crowding on the flowers of the orange and lemon trees early in the afternoon, and they rose in multitudes when disturbed. All I have examined are males, and although caught in various localities not a single fertile female has yet been discovered. It has been stated that a similar visitation took place in the vicinity of Sydney in 1855, but I do not recollect their swarming so generally, or to so great an extent or in such legions, as on the present occasion. In the 'Newcastle Chronicle' it is mentioned that Captain Twiss, of the brigantine 'Express,' which arrived in port on the 9th of October, reports that 'on the 7th of October, being 300 miles away from the coast of New South Wales, he observed a great number of moths in the sea; on the 8th, being moderately calm, the sea was literally covered with moths.' Captain Twiss was of opinion that they had been blown from the shore, but from observations on land they appeared to come from the sea in the teeth of a westerly gale."

The following is the account given by the Rev. W. B. Clarke, dated "St. Leonards, 10th October, 1867," and referred to in Dr. Bennett's letter:—

"On the 22nd of December, 1851, I camped on a thick bed of snow, just under the summit of the Mount Kosciusco range in the Australian Alps, at a height of between six and seven thousand feet, or more than a mile and a quarter above the sea. The only fuel we could obtain was from the belt of old withered dwarf gum scrub, that appears just at the snow line; our fire, therefore, was very small. About sundown an immense flight of moths came down from the granite peaks and nearly extinguished the fire. My attention being attracted to them by this circumstance, and my memory supplying the fact, that Dr. Bennett had, years before, described the moths that he saw on the Bugong Mountain, on the Upper Tumut River, I secured a specimen, which I find by comparison to be identical in species with the Agrotis that is now infesting this vicinity. It is for the sake of identification that I allude to the year 1851. On the 7th of October, 1855, St. Thomas' Church (North Shore) was visited by a great flight, which much disturbed the congregation on that day and the following Sunday, 14th October. The invaders were got rid of with great difficulty, and at some cost to the parish, on account of the injury done to the church furniture. On the 7th and 14th of October, 1866 (just eleven years afterwards) a similar visitation took place,

attended by similar results; though the moths were not quite so numerous as in 1855. The moths appeared in church this year on the 14th of September, and from that date to this have gone on increasing in numbers, until several bushels have been destroyed, though, apparently, without much diminishing the army. The state of the church was such on Sunday last (6th October) from the accumulated dust (moth-feathers), and the incessant swarms that were continually flying through the building, that divine service could not be held therein. More than seven days' hard labour in endeavouring to subdue them had been spent in vain; and since then, applications of the strongest ammonia, sulphur smoke, and other contrivances used for hours, have failed to drive them away, for as fast as one swarm is partly destroyed another succeeds. There are so many openings in the building that cannot be closed, and so many lodgments outside, that no smothering contrivance has succeeded; and as the trees and ground are full of them, the moths, if driven away for a time, muster again and return. This morning I made an attempt to reckon up the numbers grouped together on the windows, and I counted more than 80,000. In the tower and below the floor, and hidden behind the skirting, there are probably many millions. An opinion has been published, that these moths came in from the sea. A flight fully a mile in length, very thick and broad, was certainly seen on the evening of the 20th of September, travelling from the direction of the Heads along the North Shore; and another similar flight was seen at Newcastle, probably both directed by a N.E. wind, which would in the latter case have, perhaps, blown them from the projecting land about Port Stephens, and so they might have crossed the water. The sands of the sea have been known in former years to be bordered by a thick band of dead moths, doubtless blown in from the land, drowned, and washed ashore. I am told that a vessel, yesterday, twenty miles from land, was covered by them. My own observations, specially on the 22nd of December, 1851, lead me to believe that if they have migrated from a distance they have come from the west and south-west, especially as their first appearance this year was with a west wind. And it must be remembered, that previous visitations have probably left eggs enough to account for the present multitudes within less distance than that from Sydney to Mount Kosciusco."

Mr. F. Smith exhibited the moths forwarded by Dr. Bennett to Dr. Gray. They did not appear to differ from the "Bugong moth," Agrotis spina of Guénée. With reference to Dr. Bennett's remark that males only had been found, it may be observed that the box forwarded by him contained about an equal number of male and female specimens. Both sexes also have been described, in a paper read before the Entomological Society of New South Wales, by Mr. A. W. Scott, who applies to the insect the name of Agrotis vastator. The following is an extract from Mr. Scott's paper:—

"The caterpillar of this moth is fleshy, little attenuated at each extremity, subvermiform in appearance, and of a livid colour, varying much in shade, with the anterior segment furnished with a horny plate. It measures at maturity about two inches, and undergoes its transformation in the ground. The chrysalis is cylindro-conical, of a shining yellowish brown, and protected by a slight cocoon of a rough irregular ovoid form, composed of agglutinated earth. The caterpillars of several species of Agrotis, such as the one now under consideration, are very destructive on account of their numbers, feeding on the roots and leaves of low herbage, and hiding

during the extreme heat of noon under clods of earth, stones, and other convenient places. The number of larvæ, in seasons which prove favourable for their development, almost surpasses belief. . . . . A few years ago, on the Hunter River, I carefully examined a paddock of twenty-five acres, under oats for hay, which was much infested by the caterpillars of this species, and found that nearly every stalk had at least one caterpillar on it; numbers had two, many three. Taking the plants at twenty to the square foot, and each with only one caterpillar, the result would be 21,780,000 of these insects; and supposing that all these lived to become moths, each pair producing by the end of the season a progeny of 80,000, the total produce for the twenty-five acres would amount to 871,200,000,000. What, then, calculating under the same conditions, would be the number of the caterpillars which were at the time I allude to ravaging whole districts? A long line of figures almost unpronounceable.

"Allowing for every reasonable loss caused by weather not unusually severe, accident, or their numerous enemies, still there would remain quite sufficient to produce those vast numbers of moths, collected together from a wide range of country, and seen clustering in caves, under ledges of rocks, in churches, houses, barns, in every nook and cranny where their gregarious habits lead them, seeking shelter from the glare of day. I therefore think that this natural increase, aided by favourable weather, is quite sufficient to account for the swarms of moths recently seen in many localities, without having recourse to improbable theories. All moths are, in their primary stages, purely terrestrial, and cannot 'come in from the sea.' They cannot be born there, neither are their wings adapted for so long a flight as to cross the ocean from any point of land to the eastward of our coast, particularly 'in the teeth of westerly winds.' Indeed, many swarms of insects, besides the Lepidoptera, are known to be blown from the land, while a few others wilfully fly seaward under some unaccountable, almost insane, desire; but all these inevitably perish. I would suggest that the moths seen by vessels at sea were either endeavouring vainly to emigrate, or, what is *far more probable*, were driven away from the land by the prevalent westerly winds, and perished by thousands in the ocean; those seen returning to the shore were the fortunate few that had escaped before being carried too far to sea. I remember, some years ago, walking along the sands for about five miles between Newcastle and Redhead, and I observed an almost continuous undulating line of dead bodies, several deep, of these moths, marking the wash of high water along the whole of this length of beach, interrupted only by the rocky headlands; and probably this exhibition of the fate of these insects in such vast numbers was continued for a considerable distance on either hand.

"Were it not for the wholesale destruction of these vast assemblages of insect pests, caused by the violence of winds—by the fall of rain for several days successively—by sudden changes of temperature—and by the host of enemies, following in their wake, consisting of insectivorous birds and reptiles, and the numerous family of the Ichneumonidæ, I fear all the endeavours of man by artificial means to eradicate them would be baffled. The abundant food furnished by the roots and leaves of the various weeds and grasses growing over a vast extent of waste lands, will always ensure too ample a supply of such noxious creatures. We can, however, check in some degree the injury to our crops, and thus moderate the evil, by ploughing and harrowing the fallow lands, thus cutting off the immediate supply of food,—by passing the roller again and again over the growing crops when practicable,—and by encouraging, not

molesting, the many species of birds that visit the fields in flocks on such occasions. I have seen crows, large brown hawks, magpies, cranes, spur-winged plovers, and a host of smaller birds, enjoying during the day ample meals furnished by these caterpillars, and had a great difficulty in preventing the overseer from driving them away, 'because,' he said 'they eat the lucerne.' The large family of ichneumons is also a great ally of man in the war of extermination, for they pierce the body of the living caterpillars, depositing their eggs within them, and thus cause a slow but certain death before the larvæ can attain to the perfect or winged state, and on this account they ought to be encouraged.

"In January and March of the year 1865, my friend Mr. Robert Vyner visited the Bougong Mountains, accompanied in the first instance by an aboriginal 'Old Wellington,' and in the other by Mr. Sharp, of Adelong, Old Wellington, and another black fellow; both of these latter well acquainted with the habits of the moth, called by them 'Boogong' and 'Gnarliong' indiscriminately. The tops of these mountains are composed of granite, and present a series of lofty peaks, and it was up one of these, named by the natives 'Numoiadongo,' he and his companions toiled for nearly six hours before attaining the summit; so steep and rugged was the path that even the wild cattle never attempted to ascend to these heights. The moths were found in vast assemblages, sheltered within the deep fissures and between the huge masses of rocks which here form recesses, and might almost be considered as 'caves.' On both sides of the chasms the face of the stone was literally covered with these insects, packed closely side by side, overhead and under, presenting a dark surface of a scale-like pattern—each moth, however, was resting firmly by its feet on the rock, and not on the back of others, as in a swarm of bees. So numerous were these moths that six bushels of them could easily have been gathered by the party at this one peak; and so abundant were the remains of the former occupants that a stick was thrust into the *débris* on the floor to a depth of four feet. Mr. Vyner tells me that on this occasion he ate, properly cooked by Old Wellington, about a quart of the moths, and found them exceedingly nice and sweet, with a flavour of walnut—so much so that he desires to have 'another feed.' His clothes, by the moths dashing against them on being disturbed, were covered with honey, and smelt strongly of it for several days. At the time these multitudes assembled, the tea-tree and the small stunted-looking white gums were in full blossom, no doubt yielding up their honied treasures to these nocturnal depredators, whose flight, when issuing from their hiding-places to the feeding-grounds, was graphically described by Old Wellington, 'very much like wind, or flock of sheep.' The Tumut blacks report that the moths do not congregate on the high peaks in the spring time, but they first locate the lower mountains, feeding on the blossoms, which appear there earlier, and then work their way up to the higher peaks, where the plants are later in bloom.

"The Bougong moths are collected and prepared for food by the aborigines in this wise:—A blanket or sheet of bark is spread on the floor; the moths, on being disturbed with a stick, fall down, are gathered up before they have time to crawl or fly away, and thrust into a bag. To cook them, a hole is made on a sandy spot, and a smart fire lit on it until the sand is thoroughly heated, when all portions left of the glowing coal are carefully picked out for fear of scorching the bodies of the insects (as in such a case a violent storm would inevitably arise, according to their superstitious notions). The moths are now poured out of the bag, stirred about in the hot ashes for

a short time, and then placed upon a sheet of bark until cold. The next process is to sift them carefully in a net, by which action the heads fall through, and thus, the wings and legs having been previously singed off, the bodies are obtained properly prepared. In this state they are generally eaten, but sometimes they are ground into a paste by the use of a smooth stone and hollow piece of bark, and made into cakes.

"In this locality were seen many of these holes, having been formed years ago for a similar purpose, by the then numerous blacks.

"Mr. Vyner also mentions that, at the period of his visit to this peak, he saw hundreds of crows and magpies feeding upon these moths, and the foot-marks and other tracks of native dogs and tiger cats were abundant, leading direct to the fissures of the rocks, and although he did not see these animals, he adds, 'I am certain from their traces that they must feed upon the moths.'"

(See also Proc. Ent. Soc. 1839, p. xxiv.; 1840, p. xvi.; 1865, p. cxxix.)

Mr. F. Smith exhibited specimens of the Australian form of Pyrameis Cardui, sent by Dr. Bennett to Dr. Gray, "taken in November, 1860, when off Cape Otway, on the Australian Coast; multitudes of them were about the P. and O. Company's steamer 'Jeddo,' alighting in numbers on board, and were captured."

Prof. Westwood remarked that the butterfly in question had been recently separated from Pyrameis Cardui by Prof. M'Coy, and described under a new name. (See Proc. Ent. Soc. 1867, p. lxxxvii.)

Mr. Trimen exhibited a specimen of Apatura Ionia, a rare species from Asia Minor, placed by some authors in the genus Vanessa, by others in Pyrameis.

The Hon. T. De Grey exhibited Hypercallia Christierninana (see Proc. Ent. Soc. 1867, p. xcii), captured between Shoreham and Sevenoaks, in the locality where the insect was a few years ago taken by Mr. W. Farren. Also Acidalia rubricata and Opostega reliquella, *Zell.*, both taken in Norfolk in 1867; see Ent. Ann. 1868, p. 131; with reference to Mr. Stainton's remarks there published, on the swarming of Opostega salaciella, Mr. De Grey added that he also had found that insect in such considerable numbers together, that the term "swarming" was not inappropriate.

Mr. Hewitson communicated a note on the date of publication of Dr. Felder's second volume of the 'Reise der Novara,' a question of some importance with reference to the priority of nomenclature of numerous species of butterflies (see Zool. Record, vol. iii. p. 433, and Trans. Ent. Soc. 3rd series, vol. v. p. 471). Mr. Hewitson made several applications for the volume, either with coloured or uncoloured plates, at the beginning of 1867, through Messrs. Williams and Norgate, who informed him that they were unable to procure it from the bookseller in Vienna. Nevertheless the work (*i.e.* the text, with uncoloured plates) was really published at the latter end of 1865. Dr. Felder had written to him to the effect that the 'Reise der Novara' was produced by and at the expense of the Imperial Academy of Science, and was issued by the Academy with uncoloured plates; coloured plates were not kept ready for sale, and copies were only coloured to order, which fact was stated on the cover of the volume: if any one had applied at the Academy, or to the bookseller of the Academy, at the latter end of 1865, for the second volume with uncoloured plates, he could have been supplied with 400 copies.

The President also read a letter to the same effect from Dr. Felder, who, in corroboration of the above statements, enclosed a letter from Herr Carl Gerold, the

bookseller of the Imperial Academy, explaining that the reason why the work had not been supplied when ordered by Mr. Hewitson was, that the only order he had received was for a coloured copy; he had never received any order from England for an uncoloured copy.

Sir John Lubbock communicated a letter from Dr. Signoret, dated Paris, January 4, 1868, of which the following is a translation :—

"At the Meetings of the 5th and 19th of November, 1866 (Proc. Ent. Soc. 1866, pp. xxxii. xxxvi.), mention was made of the Aphis which lives in the galls of the elm, and it was spoken of as an object almost unknown at the present day, Geoffroy, Réaumur, De Geer and Et. Geoffroy (1764) being the only authors cited as having treated of this insect. It would be unfortunate for Hemipterology if that branch of Natural History had since that time fallen into oblivion, but it is not so, and to begin with I have only to cite Mr. Francis Walker, who speaks of it in his List of Homopterous Insects, p. 1049, and who cites some fifteen authors, all of whom describe it more or less at length; to whom I may add Blot (Mem. Soc. Linn. de Caen, 1824), Hartig (Germar's Zeitsch. 1841), C. L. Koch (Die Pflanzenläuse, 1857), and more recently, Passerini (Aphididæ Italicæ, Archiv. Zool. de Modène, 1863).

"At the Meeting of the 5th of November (Proc. Ent. Soc. 1866, p. xxxii.) Mr. Pascoe exhibited two females of a Coccus living under the leaves of the Eucalyptus. Mr. Schrader has published an excellent paper with three plates in the first volume of the Transactions of the Entomological Society of New South Wales, 1863, where Mr. Pascoe will certainly find his species of Coccus.

"As I have occupied myself for several years with Cochineal insects in general, and am endeavouring to bring together all the existing material on that subject, I should receive with pleasure any papers, observations or insects which might be communicated to me. As regards the insects, I should especially like to have the males, which are extremely difficult to meet with, and I would ask those who find any to be kind enough to place them in tubes with some weak spirit of wine, for when they are dried it is impossible to make drawings of them. I should also be glad of information respecting the plants on which they live, which also may be inserted in the tubes."

Mr. F. Smith thought that Dr. Signoret had misunderstood his remarks about the galls of the elm; the fact was that the galls in question had never been noticed in this country before 1866. Mr. M'Lachlan added that he had referred to Geoffroy, Réaumur and De Geer, not as being the only authors who had described the gall, but merely to show that, though new to this country, it had in fact been well known on the Continent for more than a century.

Mr. F. Smith exhibited a new species of Oryssus, from the Gold Coast, the body of which was of a splendid metallic deep emerald-green, a somewhat uncommon occurrence among the Tenthredinidæ. Also specimens of Brazilian Hymenoptera and Diptera, whose economy was described in the paper mentioned below.

The Secretary exhibited a spider sent by Lord Cawdor, from Stackpole Court, Pembroke, which was pronounced by Mr. Blackwall to be a female of Pholcus phalangioides (see 'Spiders of Great Britain and Ireland,' part 2, p. 208), a species which frequents the interior of old buildings in the South of England: having been preserved in the dry state, the abdomen had shrunk greatly, and this circumstance had

affected the colour. Mr. Blackwall added that in the spring of 1867 he received from India a species of Pholcus, described as P. Lyoni (Ann. and Mag. N. H., ser. 3, vol. xix. p. 392), one specimen of which "presented the extraordinary physiological fact of the union of the two sexes in the same individual." In this gynandromorphous spider, the left side exhibited male and the right side female characters.

Papers read.

Mr. F. Smith read "Observations on the Economy of Brazilian Insects, chiefly Hymenoptera, from the Notes of Mr. Peckolt, of Cantagallo."

Mr. M'Lachlan read "A Monograph of the British Neuroptera-Planipennia,' enumerating forty-nine species as inhabitants of the British Isles.

February 17, 1868.

H. W. Bates, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Tijdschrift voor Entomologie,' 2nd series, vol. ii. parts 2—6, vol. iii. part 1; presented by the Entomological Society of the Netherlands. 'Remarks on the Names applied to the British Hemiptera-Heteroptera,' by F. P. Pascoe; by the Author.

Election of Members.

Linnæus Cumming, Esq., B.A., and E. P. R. Curzon, Esq., both of Trinity College, Cambridge, were severally ballotted for, and elected Members.

Exhibitions, &c.

Mr. M'Lachlan exhibited a living specimen of Lucanus cervus, found under ground in an earthen or clayey cocoon: Mr. Backhouse, of Teddington, digging in his garden, had turned up half a dozen of these cocoons, each containing a beetle and the remains of the skin of the larva and pupa. It thus appeared that the beetle had not gone under ground to hybernate, but the larva had descended into the earth and had there undergone the changes to pupa and imago.

Mr. A. E. Eaton remembered one or two such cocoons being dug up in the autumn, about October, in a potato-field, and these contained living stag-beetles.

Mr. Janson also had dug stag-beetles out of earth, not wood; and thought that the specimens appearing in the spring were in fact hatched in the autumn, and remained in their cocoons throughout the winter.

Mr. Stainton compared the case to that of Cossus ligniperda, the larva and pupa of which were specially adapted for their ordinary habitat in wood, but the larva sometimes, he believed in a state of nature, and certainly in confinement, went under ground to change, and formed for itself an earthen cocoon. There was no evidence that the larvæ of the goat-moth, which were not unfrequently found crawling about on

the surface of the ground, ever re-entered a tree, and he expected that these underwent their transformations in the earth.

Mr. Janson, on behalf of Mr. A. G. Latham, exhibited two specimens of the nest or cocoon of a sociable larva from Port Natal: a large outer cocoon, three or four inches in diameter, was made up of numerous coats of brown silky matter, the whole forming a covering of considerable toughness, attached to and transpierced by a small branch of a tree: on cutting this open it was found to contain a number of smaller cocoons, each of which was tenanted by a pupa. It seemed as if a score larvæ associated themselves together to construct and build themselves into the outer family cocoon, upon the completion of which each larva proceeded to spin its own individual cocoon.

Mr. Trimen had found the same kind of cocoon in Natal: it was that of Anaphe reticulata (Walker, Brit. Mus. Cat. Lep. Het. part iv. p. 856), one of the family Liparidæ.

Mr. Janson, on behalf of Mr. Latham, also exhibited half-a-dozen larva-cases or cocoons of another Lepidopterous insect, probably a Psyche, or allied thereto. These, too, were from Natal, and were attached to and hung pendulous from the branch of a tree, resembling a cluster of large beech-nuts.

Mr. Trimen said that these cases were common in Natal on the Mimosa, or thorny acacia; he had collected many of them, but had never been able to breed a single moth of either sex.

Mr. Pascoe exhibited a beetle from New Zealand (probably from Otago), which he regarded as the type of a new genus of Cucujidæ, and which he proposed to describe under the name of Dryocora Howittii. He remarked that members of some of the clavicorn families were well known to have tarsi with varying numbers of joints; or, when the normal number were present, the basal joint was very small or almost obsolete, as in many Cucujidæ, or the penultimate was very small or almost obsolete, as in the Nitidulidæ. In Cucujus the tarsi were heteromerous in the male and pentamerous in the female; but in Dryocora, which in other respects was allied to Cucujus, the tarsi were tetramerous in both sexes, the basal joint being suppressed. Organic modifications of this kind, and the exaggerations of form of some one organ which in certain groups was found to be subject to unusual modification,—as the antennæ in Paussidæ, the eyes of Hippopsinæ, the pronota of Membracidæ, &c.,—seemed to Mr. Pascoe "to point to a law of aberration only to be explained on the hypothesis of the derivative origin of species."

The President mentioned that Mr. Darwin was engaged in elaborating the subject of secondary sexual differences and sexual selection, and would be obliged by the communication of detailed observations on the numerical proportion of the sexes of insects in nature. He had numerous cases of well-authenticated numerical excess of the male over the female, and was desirous to ascertain whether in other cases a corresponding excess of the female over the male had been noticed.

Mr. M'Lachlan mentioned Apatania muliebris, of which he had captured hundreds, but the male had never been seen; and Boreus hiemalis, of which only three or four males had been known to occur in this country. Mr. Janson mentioned Tomicus villosus, the female of which was almost a plague, whilst the male was hardly known. Mr. F. Smith cited Tenthredo cingulatus, the male of which was rare, whilst the female abounded, and Hemichroa alni, of which the male was quite unknown. Of

the latter Mr. Smith had a large number of cocoons, and if there were such a thing as a male of that species he hoped soon to breed it.

The President remarked that the different habits of the sexes must be taken into account. Among the South-American butterflies, the males of many were more handsome than the females, and exceeded them in number in the proportion of a hundred to one; the male sported in the sunshine, whilst the female was slow in flight, never appeared in the open sun, but remained in the shade of the forest: under such circumstances it might be that a superabundance of males was necessary in order to ensure the impregnation of the females and to prevent the extinction of the species; but he was unable to suggest any explanation of an excess of females over males.

Mr. Stainton thought that, by reason of the difference of habit of the sexes, little reliance could be placed upon records of a supposed disproportion of the number of the sexes of any insect when in a state of nature: it was only by breeding the insect that the relative numbers of the sexes could be ascertained with any certainty. In Micro-Lepidoptera he had often found the result of observations in the field at variance with the result of breeding the same species in confinement; species the females of which, from their retiring and secluded habits, were seldom caught, whilst the males were common, had, when eggs or larvæ were obtained, produced twice as many females as males.

Mr. M'Lachlan said that Mr. Darwin had recently put two queries to him, Do male dragon-flies fight with one another? and, Do many or several males follow one female? He confessed his inability to answer with certainty either of these apparently simple questions.

Papers read.

The following papers were read:—

"A few Observations on the Synonymy of Tinea (?) alpicella and Zelleria saxifragæ, n. sp.," by Mr. H. T. Stainton.

"On the Homologies of the Ovipositor," by Mr. A. E. Eaton.

"Contributions to a Knowledge of the Coleoptera," Part 1 (continued); by Mr. F. P. Pascoe. The following are brief diagnoses of some of the most interesting of the new genera and species:—

Elestora (*Leperinæ* affinis). Oculi liberi. Antennæ breviusculæ; clava articulis 3 transversis, perfoliatis. Labium profunde divisum, ciliatum. Corpus grossum, velutinum.

Elestora fulgurata. Aterrima; scutello, maculisque 4 magnis elytrorum aurantiacis. Long. 6½ lin. Penang.

Dryocora (*Cucujo* affinis). Palpi acuti. Prothorax apicem versus gradatim angustior, lateribus integris. Prosternum latum. Metasternum elongatum. Tarsi ♂ et ♀ 4-articulati.

Dryocora Howittii. Ferruginea, nitida; elytris subtiliter lineato-punctatis. Long. 4 lin. New Zealand.

Nessiaro histria. Atra; capite, prothorace basi excepta, elytrorumque apicibus miniaceis; elytris, corpore subtus, pedibusque cinereis, illis nigro-lineatis. Long. 10 lin. Manilla.

Orobychus (*Iphthimo* affinis). Mentum antice bilobum, in medio haud sulcatum. Tibiæ curvatæ, anteriores ♂ longitudinaliter excavatæ et intus apicem versus dentatæ. Tarsi infra breviter et sparse ciliati.

Orobychus Lacordairii (*Iphthimus Lacordairii*, Dej. Cat.). Niger, subnitidus; prothorace impunctato, 4-foveolato, marginibus elevatis, subcrenatis, nitidis; elytris foveis magnis dense impressis; femoribus posticis ♂ intus ochraceo-hirsutis. Long. 20 lin. Brazil.

Bycrea (inter *Trachyscelinas* et *Phaleriinas*). Labrum clypeo occultum. Genæ medium oculorum impingentes. Prothorax basi bisinuatus. Mesosternum antice incisum. Tarsi unicalcarati. Corpus marginibus ciliatis.

Bycrea villosa. Late ovata, fusca, pilis aureo-brunneis tecta; elytris maculis denudatis; scutello glabro, nigro, nitido. Long. 3 lin. Mexico.

Orcopagia (*Bolitothero* affinis). Antennæ 10-articulatæ, clava bisarticulata. Epipleura indistincta. Tibiæ anticæ crescentiformes. Tarsi articulo basali libero.

Orcopagia monstrosa. Elongata, rufo-ferruginea, valde tuberculata; clypeo cornuto; prothorace gibboso, caput occultante; elytris parallelis, postice abrupte declivibus. Long. 4 lin. Australia.

Blepegenes (*Atryphodi* affinis). Caput exsertum. Clypeus haud incrassatus; sulcus clypealis in medio interruptus; auriculæ oculares recurvatæ et in spinam productæ. Prothorax antice truncatus.

Blepegenes aruspex. Cupreo-fuscus; prothorace 4-foveolato, utrinque 2-spinoso, spina antica producta, paulo recurvata, postica parva; elytris carinis 10 nitidis ornatis. Long. 9 lin. Australia.

Asphalus (gen. *Pedininarum?*). Trophi ut in *Pedino*, sed lobo interiore maxillari fortiter hamato. Antennæ articulo 3o vix 4o longiore. Prothorax basi bisinuatus. Tibiæ anticæ et tarsi (♂?) simplices.

Asphalus ebeninus. Aterrimus, nitidus, lævis; elytris fere obsolete punctato-striatis. Long. 8 lin. Australia.

Artactes (*Hemicyclo* affinis). Tarsi articulo ultimo elongato. Prosternum postice subdepressum, excavatum. Corpus hemisphericum.

Artactes nigritarsis. Viridi-cæruleus, nitidus; tarsis nigris. Long. 4 lin. Sumatra.

Psydus (*Dicyrto* affinis). Antennæ breves, articuli 7—11 transversi, compressi. Mesosternum excavatum. Tarsi articulo ultimo elongato.

Psydus plantaris. Fusco-metallicus; elytris irregulariter impresso-punctatis; tarsis subtus fulvo-pilosis. Long. 6 lin. Ceylon.

Diestica (gen. *Strongyliinarum*). Antennæ articulis 4 (vel 5) apicalibus transversis, dilatatis. Oculi distantes. Prothorax lateribus carinatus.

Diestica viridipennis. Elytris obscure viridibus, basi humerisque exceptis; antennis luteis, clava nigra. Long. 6 lin. Ega.

Eupromus. Tuberes antennarum validi, erecti, approximati; scapus brevis, obconicus, apice valde cicatricosus. Prosternum elevatum. Pedes æquales. Typus, "*Oplophora* (*Callimation*) *Sieboldii*," Guérin = *Monohammus Championi*, White. Japan.

Bixadus. Antennæ articulo 3o haud 4o longiore. Oculi sat magni. Pedes æquales, femora incrassata. Pro- et meso-sterna declivia. Typus, *Monohammus Sierricola*, White. Sierra Leone.

Anthores. Antennæ articulo 3o sequentibus longiore. Oculi mediocres. Elytra basi cristata. Pedes æquales, femora incrassata. Pro- et meso-sterna declivia. Typus, *Monohammus leuconotus*, White. Natal.

Opepharus (*Monohammo* affinis). Antennæ longissimæ, articulis 3o et 4o æqualibus, ultimo subulato. Elytra basi cristata. Pedes robusti, intermedii minores; femora in medio incrassata. Pro- et meso-sterna declivia.

Opepharus signator. Griseus, cinereo varius; elytris pone medium maculis 6 nigris. Long. 13 lin. Madagascar.

Thysia viduata. Breviuscula, plumbeo-nigra; prothorace utrinque spinoso; elytris fasciis 5 vel 6 atris, apicibus emarginatis; mesosterno producto. Long. 12 lin. Sumatra.

March 2, 1868.

H. W. Bates, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'The Journal of the Linnean Society,' Zoology, No. 39; presented by the Society. Newman's 'British Moths,' No. 15, and 'The Insect-Hunter's Year-Book for 1867;' by the Author. 'The Zoologist' for March; by the Editor. 'The Entomologist's Monthly Magazine' for March; by the Editors.

Election of Members.

G. A. Lebour, Esq., of the Geological Survey Office, and Captain A. F. Lendy, of Sunbury, were severally ballotted for, and elected Members.

Exhibitions, &c.

Mr. Edward Saunders exhibited various species of Buprestidæ which he had compared with the Fabrician type-specimens in the collection of Sir Joseph Banks, with a view to the correction of several errors of nomenclature. Thus the insects known as Psiloptera morbillosa, Dicerca lurida and Belionota canaliculata were not the true morbillosa, lurida and canaliculata of Fabricius: the species commonly called Ancylocheira flavomaculata, *Fabr.*, was in fact the maculata of Fabricius, whilst the maculata of authors other than Fabricius was identical with the strigosa of Gebler. Mr. E. Saunders also exhibited Pasiphae modesta and Ethon cruciatum, which, though described by Fabricius, and figured by Olivier and Herbst, had not been noticed by recent authors, except that Gory had described, under the name of Buprestis superba, an insect which was not specifically distinct from P. modesta.

Mr. Pascoe exhibited the type of a new genus of Prionidæ, captured by Mr. Swanzy; and read the following description:—

"Eudianodes (*Colpodero* aff.).—Clypeus distinctus. Prothorax marginibus angustatis, serratis. Mesosternum latum. Tibiæ simplices, compressæ; tarsi breves, articulo ultimo cæteris fere æquali. Corpus haud validum.

Eudianodes Swanzii.—Niger, nitidus; capite prothoraceque subtiliter punctatis, hoc macula magna fere tripartita fulva ornato; elytris subtilissime punctatis. Long. 11 lin. Hab. Cape Coast Castle."

Mr. Pascoe also read the following description of a new species of Curculionidæ:—

"*Oxycorynus hydnoræ.*—Rufo-fuscus; rostro attenuato; fronte prothoraceque creberrime punctatis; elytris 6-carinatis, interstitiis granulatis. Long. 6 lin. (rostro incl.). Hab. Catamarca."

This Oxycorynus formed part of the contents of a small box sent from South America by Mr. F. Schickendantz, of Pilciao (see Proc. Ent. Soc. 1867, p. cviii). The other insects in the box were a Xylopertha, resembling X. sinuata, but smaller; two species of Nitidulidæ, apparently near Carpophilus; and a Saprinus, with a large yellow spot on each elytron. The whole of these were stated by Mr. Shickendantz to have been found by him "in the flowers of a new species of Hydnora" (a genus of Cytinaceæ, root-parasites, some of which exhale a peculiar animal odour).

Mr. T. W. Wood (who was present as a visitor) exhibited pupæ of several Lepidoptera from Sierra Leone, one of which, apparently an Antheræa, was remarkable from having two very deep impressions near the hinder extremity. Mr. Wood mentioned that he had once opened a pupa of Sphinx Ligustri, and found that the haustellum was of the moth, after passing down the projecting snout of the pupa and up again, was continued down the breast of the insect and terminated on a level with the extremity of the wing-cases.

With reference to the numerical disproportion of the sexes of insects (*ante*, p. x), Mr. Stainton mentioned that since the previous Meeting he had inquired the results of the experience of Mr. Doubleday and Mr. Hellins in breeding Micro-Lepidoptera. Mr. Doubleday thought that males were generally more numerous than females, and did not remember a single instance in which he had met with an excess of females. Mr. Hellins, on the other hand, reported that he had usually found females more numerous than males.

Mr. Stainton added that Mr. Darwin would be glad to receive replies to the following further inquiries:—(1), whether sexual attraction or fascination was exercised in the same manner by butterflies which have the wings gaily ornamented on the under side and by those which have dark under sides, as *e.g.* by Argynnis and Vanessa; (2), whether any and what moths were more brightly coloured in the male than in the female sex; and (3), whether any and what moths were more conspicuously coloured on the under side than on the upper side of the wings. (In reply to the third query, Mr. Wormald mentioned the genus Hypopyra). Mr. Darwin was also desirous of acquiring facts bearing on the distinction between sexual and protective colouring in insects; and of ascertaining the causes which decided the success of one out of several males which were in pursuit of the same female.

March 16, 1868.

H. W. Bates, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Stettiner Entomologische Zeitung,' 1868, Nos. 1—3; presented by the Entom. Verein zu Stettin. 'Coleopterologische Hefte,' II.; by the Editor, Baron Edgar von Harold. 'Monographie der Scydmæniden Central- und Süd-Amerika's;' by the Author, Dr. L. W. Schaufuss.

Election of Member.

Charles Carrington, Esq., of Westwood Park, Forest Hill, was ballotted for, and elected a Member.

Exhibitions, &c.

Mr. F. Smith exhibited a specimen of the larva of a Lepidopterous insect from Brazil, which was described by Mr. Peckolt, of Cantagallo, as being of a social habit, and forming a common cocoon as large as a man's head, within which each individual formed its own proper cocoon. The larva was covered with spines, like a Vanessa or Acræa; and appeared to belong to one of the Diurni rather than to one of the Bombyces. (See Trans. Ent. Soc. 1868, p. 136).

Mr. Stainton directed attention to the account given by Herr Hartmann, in Stett. Ent. Zeit. 1868, p. 109, of the breeding of Sesia cephiformis, Grapholitha duplicana, *Zett.* (interruptana, *H.-S.*), and Gelechia electella, from gall-like swellings on the twigs of juniper bushes: an examination of the juniper during the spring would probably lead to the discovery in this country of the larvæ of the two last-mentioned species.

The President announced the proximate publication, by Dr. Gemminger and Baron E. von Harold, of the first part of a General Catalogue of Coleoptera, intended to include all the hitherto-described species of the whole world: the classification would be based on that of Lacordaire, the species of each genus being arranged in alphabetical order.

Mr. F. Smith read a paper on ants, extracted from 'The Guardian' of 1713, and, as the result of an elaborate and amusing criticism thereof, contended that the history of the habits of those insects therein contained, detailed and circumstantial though it were, could not be a record of actual observations, but was chiefly, if not entirely, the offspring of the imagination of the writer.

April 6, 1868.

H. W. Bates, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—Hewitson's 'Exotic Butterflies,' part 66; presented by W. W. Saunders, Esq.

Newman's 'British Moths,' No. 16; by the Author. 'The Zoologist' for April; by the Editor. 'The Entomologist's Monthly Magazine' for April; by the Editors. 'Proceedings of the Holmesdale Natural History Club, for 1866-67,' and 'Natural History of Reigate and its Vicinity: List of Coleoptera, Part 2;' by the Holmesdale Natural History Club.

Exhibitions, &c.

Mr. Stainton exhibited larvæ of a new species of Nepticula, sent from Mentone by Mr. Moggridge, where they were found in the leaves of Euphorbia dendroides. The perfect insect had been obtained from larvæ of the previous season, and would be described as Nepticula euphorbiella.

Mr. Stainton also exhibited the specimen which in 1854 he had described ('Insecta Britannica,' iii. 47) under the name of Nemophora Carteri; it was formerly in the collection of the late Mr. S. Carter, of Manchester (who, however, was unable to give any account of the insect or its place of capture), and had now passed into the possession of Mr. S. Stevens. Recent examination had convinced Mr. Stainton, and the exhibition of the specimen satisfied the other Lepidopterists present, that the supposed Nemophora Carteri was a fabrication, made by attaching the hind wings of a Cerostoma to the fore wings of a Nemophora.

Mr. W. C. Boyd exhibited a strongly marked variety of Stenopteryx hybridalis, captured in Hertfordshire.

Mr. J. Jenner Weir exhibited a Polyommatus captured at Lewes, which he regarded as a hybrid between P. Adonis and Alexis; also varieties of P. Corydon and Alexis, with confluent spots on the under side, and a male-like female of P. Alexis.

Mr. Druce exhibited a collection of butterflies collected by Mr. Pearson in Bolivia.

Mr. F. Smith mentioned that about September, 1866, Mr. Waring Kidd had sent to the British Museum a pollard oak, which was placed in a closed case in one of the galleries, for the purpose of showing the *modus operandi* of Cynips Kollari. In the spring of 1866 a numerous brood of Clytus arietis appeared in the case; they were observed running about the oak-stump for about three weeks, when, unable to escape, they died, and their remains were afterwards swept away. The same thing occurred in 1867, and in 1868, on the morning of the Meeting, the Clytus had made its third appearance. The large quantities of camphor placed in the Museum cases did not seem to affect them, or to prevent the development of the beetle.

Mr. Janson said that camphor, though useful in preventing the entry of insects, was powerless to destroy them: at the same time he doubted whether the Clytus had been reproduced in the Museum; the insect probably remained in the larva state for two or three years, and it was quite possible that all the larvæ from which the successive broods of 1866, 1867 and 1868 had appeared were present in the wood on its admission into the Museum in 1865.

OCT. 13, 1868.

May 4, 1868.

H. T. Stainton, Esq., Vice-President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Catalogue of Scientific Papers (1800—1863), compiled and published by the Royal Society of London,' vol. i.; presented by the Royal Society. 'Proceedings of the Royal Society,' Nos. 98—100; by the Society. 'The Journal of the Quekett Microscopical Club,' Nos. 1 and 2; by the Club. 'The Journal of the Linnean Society,' Zoology, No. 40; by the Society. 'The Journal of the Royal Agricultural Society of England,' 2nd series, vol. iv. part 1; by the Society. 'Bulletins de l'Académie Royale des Sciences, &c., de Belgique,' 2me ser., t. xxiv.; by the Academy. 'Bulletin de la Société Impériale des Naturalistes de Moscou,' 1867, No. II.; by the Society. 'Essai d'une Faune Entomologique de l'Archipel Indo-néerlandais,' par S. C. Snellen van Vollenhoven. Troisième Monographie: Famille des Pentatomides, 1re Partie; by the Author. 'On Pauropus, a New Type of Centipede;' and 'Notes on the Thysanura,' Part iii.; by the Author, Sir John Lubbock, Bart. 'On the Lepidopterous Insects of Bengal,' by Frederic Moore; by the Author. 'Remarks on the Names applied to the British Hemiptera Heteroptera,' by J. W. Douglas and John Scott; by the Authors. Newman's 'British Moths,' No. 17; by the Author. 'The Zoologist,' for May; by the Editor. 'The Entomologist's Monthly Magazine,' for May; by the Editors.

Exhibitions, &c.

Mr. W. C. Boyd exhibited a number of skins of larvæ of Lepidoptera, admirably prepared by Mr. Davis, of Waltham Cross, so as to preserve both the form and colour of the caterpillars.

Mr. Trimen exhibited a crippled specimen of Saturnia Pavonia-minor, which, owing probably to the form and smallness of the box in which it was confined, had attempted to emerge from its cocoon tail-foremost, but failing in the attempt was found fixed with its head in contiguity with the head of the pupa-skin.

Dr. Wallace, of Colchester, offered to send eggs of the Japanese oak-feeding silkworm, Bombyx Yamamai, to any Member of the Society.

Mr. Stainton drew attention to the plate illustrating a paper entitled "Histoire d'une Chenille mineuse des feuilles de vigne, extraite d'une lettre écrite de Malte à M. de Reaumur," published in the 'Memoires de l'Académie Royale des Sciences de Paris,' in 1750. The habit of the footless larva which attacked the vine in Malta and produced a small moth was so carefully described and pourtrayed by M. Godeheu de Riville, that there was no difficulty in recognizing it as congeneric with the footless larvæ of Antispila Treitschkeella and Pfeifferella, and Mr. Stainton some time since proposed the name of Antispila Rivillii, in the hope that the species would be again detected in some of the vine-growing districts of Southern Europe. To the present day, however, the moth remains unknown, and the larva is known only by the record of M. de Riville.

Mr. Hewitson communicated the following note on Tachyris Jacquinotii (see Trans. Ent. Soc. 1868, p. 99):—

"I find, from a recent visit to the Jardin des Plantes, in Paris, that the Pieris described by Lucas under the name Jacquinotii is nothing more than a highly-coloured variety of P. albina, and when Mr. Wallace went over my collection I understood that he considered it as such. It does not come, as stated by Lucas, from New Guinea, but from New Caledonia, and has not, as I suggested, any relation with the South-American P. Isandra."

Mr. M'Lachlan mentioned that the Anax mediterraneus of de Selys Longchamps, which had on a solitary occasion been captured in the Island of Sardinia, but had been rejected from the list of European dragon-flies, was observed in swarms at Turin and in other parts of Italy by Dr. Ghiliani and others, on numerous occasions, from July to September, 1867.

Mr. F. Smith exhibited a larva which he believed to be a Xantholinus, found by Mr. O. Janson whilst digging in a sand-bank at Snaresbrook: attached by their hinder extremities to the under side of this larva, on the 5th, 7th, 9th and 11th segments respectively, were four pupæ of a Hymenopterous parasite, probably a Proctotrupes.

Mr. F. Smith also exhibited a Longicorn beetle, Cerosterna gladiator, and a large Acheta, which were very destructive to forest-trees in Madras.

Dr. Cleghorn, Conservator of Forests, Madras (who was present as a visitor), said that these insects had done great damage in the young Casuarina plantations along the Madras Railway. The attacks of the beetle were principally directed to the bark of the trees; but the cricket generally bit off the leading shoots or primary branches. It appeared suddenly in September, 1867, after some showers of rain at the end of the hot season: during the night the larvæ emerged from the sand, crawled up the young trees, and nibbled off the leading shoots (as a rabbit might have done), many of which, six inches long, were found lying on the ground; hundreds of trees had to be replaced on the railway-banks in consequence of their depredations. The best way to save the trees was to employ boys to dig out the larvæ from the tortuous galleries or passages which they made in the sand to a depth of ten to fifteen inches, and large enough to admit the little finger: he had had bushels of them dug out of their burrows and destroyed. In reply to inquiries, Dr. Cleghorn stated that he had himself frequently seen the larvæ crawling up the stems, and was convinced that they were the authors of the injury, but he had never seen them in the act of cutting off the shoots.

Mr. Trimen mentioned, as a parallel case, a tree-cricket at the Cape which eats the terminal shoots of the silver-tree (*Leucodendron argenteum*), by which, however, the shoots are not wantonly bitten off, but are consumed for food.

Mr. F. Smith exhibited eight kinds of larvæ from India, all of which were described as "borers," and as causing great damage to the coffee and other trees. Three of them appeared to be Lepidopterous; one, the "red borer" of Ceylon, which attacks a tree in the middle of the stem and works its way upwards through the pith, belonged to a species of Zeuzera; a second, which was a somewhat similar larva, was found in the pith of the charcoal tree (*Sponia Wightii*); the third, the "great white borer," also looked like a Zeuzera, and was usually found at the root of coffee and

other trees. The remaining five larvæ were Coleopterous; one was probably a Pyrochroa, and was found in the coffee tree; another, a Buprestis, found in the root of a dead coffee tree; a third, an Oryctes, found in a dead forest tree in a coffee plantation; a fourth was a Longicorn; and the fifth was the "white borer," or "coffee borer" *par excellence*, Xylotrechus quadripes of Chevrolat. Of this insect numerous specimens in all its stages were exhibited, together with the stem of a coffee tree attacked by the larvæ.

With respect to the last-mentioned insect, Mr. F. Smith drew attention to a pamphlet (Madras, 1867) entitled 'Preliminary Remarks on the Ravages of the Borer in the year 1867,' by Colonel C. P. Taylor, of the Madras Staff Corps. The following are extracts:—

"A very prevalent opinion exists, I believe, that the borer may come to nothing, or it may exterminate our plantations entirely. I confess that when I read of the successes and failures of various kinds of cultivation, and reflect upon the good and bad seasons all over the globe, when I consider how many luxuriant coffee estates have for so many years succeeded in India, and moreover when I admit the undoubted fact that the red borer has been known for years on our estates and in Ceylon, I cannot regard the extraordinary visitation of 1867 in any light but that of a plague which has come upon us, and with due care and precaution on our part will pass away. . . . . The borer was very destructive in 1859. His ravages in 1867 are certainly more alarming, but I believe that although this insect may remain more or less on the estates, such fatal ravages are not likely to occur for many years. It is impossible to disguise the damage already done, and doubtless this becomes a most serious question, but I trust that many an estate may yet be saved to its owners. I understand that some proprietors contemplate no further outlay, but purpose taking the coming crop, whatever it may be, and then abandoning their properties. . . . . It has been advanced by some persons who take a desponding view of this calamity that the coffee estates may die out in the same manner as the vines have perished in Madeira. I think we should dismiss any idea of this kind from our minds altogether, as the cases are not analogous. The vines, it is generally admitted, perished from a disease of the trees themselves, and not from any insect. The theory that the borer only attacks weakly trees (though supported by a most eminent entomologist with regard to ligniperdous insects) is, I believe, open to question in this case. Mr. Young, the Chairman of the Carnatic Coffee Company, in writing from personal inspection, declares that 'the finest trees are its choice victims;' and I believe every planter who has seen the borer in any numbers will bear me out in the assertion that the insect is indiscriminate in its ravages. It is quite possible that men who formed a different opinion on their own estates were mistaken, and that the sickly appearance they observed was in reality the borer who had entered the year before unnoticed. . . . The trees which on passing through an estate the planter can perceive are showing signs of something wrong should, in my opinion, be taken up, and nightly bonfires be lighted with a collection of them. . . . . Some estates which have had the borer for some three or four years are nearly destroyed. If the affected trees had been burnt the first year, I believe that such estates might have been saved to a great extent. As it is, on some estates, as many as seventeen perfect beetles have been discovered in one tree, in addition to others in the pupa state. . . . . My impression is that the

white borer has been in many plantations for several years, and that he goes on, maturing or expiring, according to the weather. These dry seasons have enabled him to make a great stride in his work of destruction, and the trees have become loaded with larvæ. . . . . I advise the burning of all affected trees; and as it has, I believe, been almost universally admitted in Coorg and Mysore that shade is beneficial, I should plant shade in the vacancies instead of young coffee, which rarely succeeds with old plants. . . . . The handling of trees for the removal of any eggs might be useful. . . . . Fish-oil and soot are spoken of, to stop the trees with, and chloride-of-lime water, or arsenic solution, or cyanide of potassium, to be syringed into them. Of all preventive and remedial measures as yet proposed, I consider the most valuable to be the plan of whitewashing the trees when good lime can be procured. Fires should invariably be lighted at this season, because it appears that the borer beetle escapes at night, and during this month (September). At the same time it is probable the beetle may escape during the daytime also. It has the power of boring its way out of the tree after it has changed from the pupa to the perfect beetle, notwithstanding that it may have to open a considerable aperture for the egress of its body. It is, in fact, furnished with a boring apparatus as effective in its purposes, though not of the same description, as that of the larva. This was exemplified in an experiment made by Captain Mitchell, of the Madras Museum, and myself. A portion of a coffee tree which we split up (brought from Coorg about ten days before) disclosed a beetle in a cleft of the tree, which proved afterwards to be a female. She appeared to have no inclination to escape, though she could easily have done so. She was comfortable and apparently torpid in her hole. We tied up the piece of the tree tightly, and Captain Mitchell placed it in a glass bottle with a stopper. In the morning he examined it, and found the beetle outside the wood, lively, and running up and down in a wonderfully active manner, feeling about with her antennæ as busily as possible. On examination of the piece of the tree, we found that during the night this insect had bored a large hole outwards, and had come out of the bark from the position in which we first discovered her. . . . . It is doubtful whether the beetles will fly into the fire, though they will come round it in great numbers, in which case coolies with nets or branches of trees might kill a great many. . . . . Can we introduce or encourage the breed of any animals inimical to insect life? Can the ornithologist be of any service here? Those birds which live chiefly in trees and hedges, if encouraged and protected on an estate, might prove formidable enemies to the borer. Flocks of guinea-fowls would kill a large number of insects; . . . . they are mostly attached to white ants and grubs, but this borer is a very diminutive insect considering his powers of destruction, and I have no doubt the guinea-fowl would take to him amazingly. . . . . Is it the case that, after two or more seasons of failure in the average amount of rain, the coffee trees become to a certain extent sapless, and offer an easy prey to ligniperdous insects of all kinds? I have stated before that this is open to question, but it has been asserted that such is the case, and that when the trees are luxuriant, and from constant showers in seasonable and heavy monsoons they have become in a high state of cultivation and are full of sap, the borer cannot make so much way in his depredations; he is, in fact, bothered (so to speak) by too much moisture in the wood. There are doubtless various kinds of borers, some of which have actually attacked this year the sandal-wood, whose scent it was supposed would scare the hungriest larvæ; some again have

attacked dried-up and utterly sapless trunks, in whose fibrous elements not a particle of nourishment could be supposed to dwell. . . . . It is important to discover if a juicy or a sapless coffee bush is selected by the borer, and if so, by what borer. . . . I believe that the white or red borer was originally indiscriminate in his attacks, either in shade or the open. I believe that the spread of insects has greatly increased by the absence of shelter for the birds of the forest. . . . . I think that in many cases which have undoubtedly occurred, where the coffee in the open has been so fearfully injured by insects, the real cause has been that the warmth of such situations is peculiarly favourable to insect development. Millions of eggs might be hatched in such situations, which would rot in a damp or shady position with the forest overhead. Once hatched the larvæ can only attack the tree in which they are placed. It will be asked, how do I account for the little injury done by the red borer in Ceylon, although the coffee is almost all in the open? I answer, the great and almost constant dampness of the climate is inimical to the borer, and prevents his being so prolific as in warm and dry situations. . . . . This view of the case is also borne out by the fact that in cool situations in India, such as estates at high elevations, the destruction has hitherto been of little consequence; whereas the estates which have suffered most seriously are in every case, I believe, at low elevations with a high temperature. It is a question, however, if a coffee tree can be too full of sap, too moist, too juicy, or too succulent to present a favourable field for the attacks of the dreaded white borer. All I say is, I doubt it. On examination of numerous trees, I am led to believe that if the borer larvæ had the power of selecting their food, they would undoubtedly choose the tree in which there was the most nourishment. . . . . If I am correct in my argument, we at once grasp at one of the causes of the great havoc of 1867. Man has transformed many a cool and shady forest into a hot and shadeless coffee garden, and has removed the chief enemies of the borer, cold and damp. Nature, for three years withholding her ordinary showers, has assisted certainly, but may not the result be attributable to man? May he not, by a too indiscriminate felling of forest in hot exposed situations, have caused the great increase in insect development, the results of which we now so bitterly deplore? . . . . When I was clearing away jungle, four years ago, on my estate at Nemaur in the Nuggur Division of the Mysore country, the Brahmins warned me against removing the shade. 'If you cut the trees down,' they said, 'the sun will be very hot, and will bring poochies' (insects). I was under the impression that the climate of Nemaur was too damp and the rains too heavy for shade, or even partial shade, for the coffee, but I find I was mistaken, and we are now actually planting shade in parts of the estate. The elevation is about 2800 feet. It is also an interesting subject for inquiry, if the felling and dying out of any bamboos or jungle trees have driven the borer to the coffee. The theory that because in hot dry situations, unshaded from the scorching rays of the sun, the coffee tree becomes exhausted and sapless, and therefore the more liable to the attacks of the borer, who, in fact, proceeds to that portion of the estate in the first instance, and lays her eggs there in preference to the shady portions, may be the correct one, but it does not appear to me to be so. One thing is plain, *viz.* that throughout the coffee districts of South India, the trees in the open have suffered incalculably more than those in shade. At least I am satisfied that this is so as far as regards Coorg and Mysore. . . . . In Coorg there is a legend that when bamboos die insects are created in myriads and attack all trees. Now in 1867 the

bamboos in Coorg have died in enormous quantities. It is believed that they do so in a cycle of sixty years. . . . . Some planters have noticed the beetles at night collect against the windows of their houses, attracted by the light inside. Now insect-traps might be so constructed with lights as to secure great numbers in different parts of an estate during the night. It has occurred to me that a simple contrivance would be a mud hut, lighted up and roofed in, with apertures all round, and the walls inside and out hung with cloth covered with some sticky tenacious substance, with which the floor also should be covered, which would disable the beetle on contact. The natives prepare a capital bird-lime, which would answer the purpose, from the juice of the banyan tree (*Ficus indica*). . . . . A still simpler contrivance would be a large basket like a common native bird-cage, or a round and more substantial trellis-work might be constructed, open at the top, in any case covered with a sticky substance and a lantern in the centre. Another plan which has occurred to me for a trap, is a square shallow trough, with a lantern in the centre, filled to about half-an-inch with liquid molasses. It is feared that pitch would not answer, as the smell would deter the beetles from approaching."

Captain Ralph Taylor, a resident and planter in Coorg (who was present as a visitor), gave his personal experiences of the "white borer," stating that he had known coffee trees of twelve years old destroyed by thousands; that the beetle emerged at all times of the year, or at any rate in August and from November to February; and that lime, and light, and other things had been tried, but no remedy had proved effectual. At the same time he was disposed to take a hopeful view, and believed that the evil was already on the decrease and would soon disappear; whilst he had last year obtained from 7 to 8 cwt. per acre from a plantation which was attacked by the "borer." He had himself known the white borer since 1863.

Dr. Cleghorn said that other trees beside the coffee were attacked by the Xylotrechus, and he thought that drought was a predisposing cause which rendered the trees either more liable to be attacked or less able to resist attack.

Mr. F. Smith remarked that Col. Taylor's opinion, that the borer larvæ would from choice select the trees in which there was most moisture or nourishment, was directly opposed to his own experience of the habits of the species of Clytus found in this country; he had never found either the larva or perfect insect in any other than dead wood, or in the decaying branches of living trees. The borer had no doubt existed in India long before the coffee-plant was cultivated, and as clearings of jungle were made it naturally resorted to the plantations so admirably suited to its requirements. If the planters abandoned their properties, the insect would have the opportunity of increasing without check and would spread over the neighbouring plantations. Mr. Smith had observed Clytus arietis in this country to be usually very abundant about the same stump or railings for four or five years in succession, when they appeared to move off to fresh quarters, the larvæ having, as he supposed, so riddled the posts that little or no wood remained to be fed upon.

Mr. Janson expressed his conviction that, as in this country, so also in India, it was decaying or unhealthy trees alone that were attacked by Clytus.

Papers read.

The following papers were read:—

"On the Duration of Life in the Honey Bee," by Mr. J. G. Desborough.

"Descriptions of Aculeate Hymenoptera from Australia," by Mr. F. Smith.

New Parts of 'Transactions.'

Trans. Ent. Soc., third series, vol. iii. part 5, containing a further instalment of Mr. Pascoe's "Longicornia Malayana," and the first part of 'The Transactions of the Entomological Society of London for the year 1868,' were on the table.

June 1, 1868.

H. W. Bates, Esq., President, in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Verhandlungen der K. K. zoologisch-botanischen Gesellschaft in Wien,' vol. xvii.; presented by the Society. 'Stettiner Entomologische Zeitung,' 1868, Nos. 4—6; by the Society. 'On the Diurnal Lepidoptera of the Extra-tropical Northern Hemisphere,' by W. F. Kirby; by the Author. 'The Odonat-Fauna of the Island of Cuba,' by Dr. H. Hagen; by the Author. Newman's 'British Moths,' No. 18; by the Author. 'The Zoologist' for June; by the Editor. 'The Entomologist's Monthly Magazine,' for June; by the Editors.

The following addition, by purchase, was also announced:—C. G. Thomson, 'Skandinaviens Coleoptera,' vols. viii. and ix.

Election of Members.

G. P. Shearwood, Esq., of Cedar Lodge, Stockwell, was elected a Member; Il Cavaliere Francfort, of Pallanza, Lago Maggiore, was elected a Foreign Member.

Exhibitions, &c.

The Secretary announced that an exhibition of useful and destructive insects would take place in the Palais de l'Industrie, at Paris, during the month of August. The Committee of Management includes Dr. Boisduval, M. Guérin-Méneville, and other entomologists and scientific agriculturists. The exhibition is to be made as comprehensive as possible, the scheme including the propagation of useful insects, methods of curing or preventing disease, and economical management; and the illustration of destructive insects, with means for opposing their ravages. As regards destructive insects, the Committee has determined on a practical instead of a scientific classification, the subdivisions being formed by the plants upon which the creatures feed. Foreigners are invited to take part in the coming exhibition; applications to be sent in before the 20th of July, to the Secretary of the Société d'Insectologie Agricole, No. 1, Rue Cadette, Paris, or at the Palais de l'Industrie. The insects or other objects of exhibition are to be sent in before the 25th of July, and the exhibition opens on the 1st and closes on the 31st of August. The following are the principal heads of classification:—First division—Useful insects:—1st class, Silk-producing insects; 2nd class, Insects producing honey and wax; 3rd class, Insects used in dyeing and

for colour; 4th class, Edible insects, crustacea and mollusks; 5th class, Insects employed for medical use; 6th class, Insects used as ornaments. Second division—Destructive insects:—Ten classes, *viz.* those which attack cereals, the vine, plants used in industry, forage, vegetables and ornamental plants, fruit trees, forest trees, timber used for building, truffles and fungi, dry organic matters, and, lastly, parasites of man and domestic animals. The third division includes three classes—carnivorous insects, parasitic insects; destructive of chrysalides; and insectivorous animals, birds and reptiles. The fourth division includes—Insects and other creatures destructive of mollusks; and notices respecting edible snails and the benefit that cultivators may derive from them. Lastly, optical instruments for entomological purposes, and special apparatus connected with the rearing or destruction of insects. Printed or written memoirs are also to be admitted, even without specimens of the insects to which they refer; and it is further announced that conferences will take place in the exhibition on various subjects connected with "insectology" [? Entomology].

Mr. M'Lachlan exhibited the larva of a caddis-fly found by Mr. Fletcher, of Worcester, crawling about the bark of willow trees: the case was like a Coleophora, but the feet of the larva showed it to be Trichopterous, not Lepidopterous. Enœcyla [Enoicyla] pusilla, a species of which the female was apterous, had for some time been known on the Continent to have a non-aquatic larva, and M. Snellen van Vollenhoven found the larvæ in great numbers at the Hague: this species had not yet been found in Britain, but Mr. Fletcher's larvæ were probably to be referred to it. It would be interesting to ascertain how the larva breathed, whether or not by spiracles.

Mr. J. Jenner Weir called attention to the Report, in the 'Journal of Horticulture' for May 21, 1868, of the Proceedings of the Scientific Committee of the Royal Horticultural Society, in which it was stated that on the 19th of that month "Mr. Berkeley exhibited specimens of the larva of Coleophora hemerobiella, which attacks the leaves of the pear and cherry, not as is usually the case by eating away the whole substance, but by attaching themselves by their discoid suctorial mouth, and extracting the sap from the parenchyma for some distance round the point of attack; which when they have exhausted they leave, and commence an attack in another part of the leaf, leaving a small hole similar to a leech bite. Finally they enclose themselves in the leaf, which is rolled up into the form of a tiny cigarette." Mr. Weir presumed that no one of the entomologists attached to the Scientific Committee could have been present at the promulgation of a statement so full of error.

Mr. Keays exhibited specimens of Psyche crassiorella from Hornsey Wood.

The Hon. T. De Grey exhibited pupæ of Hypercallia Christierninana; the larvæ were found on Polygala vulgaris between the 27th of April and the 22nd of May, near Shoreham, and one became a pupa during the Meeting. The pupæ were of a beautiful bright green colour, attached by their hind extremity only to the sides of the glass cylinder in which they were exhibited, and were not suspended loosely by the silken attachment, but rigidly fixed in an oblique position at an angle of about 60° to the side of the cylinder.

Mr. A. G. Butler (who was present as a visitor) exhibited a small and pale variety of Nemeobius Lucina, and a pair of Anthocharis Cardamines, all from Herne Bay. Both sexes of A. Cardamines were remarkable for the largeness of the black spot on the disk of the fore wings, and the male had a rudimentary tail to the hind wings.

OCT. 12, 1938.

Mr. Burmeister, jun. (who was present as a visitor), exhibited numerous drawings of larvæ of Brazilian butterflies, and pupa-skins of many of them. Amongst the latter was Ageronia Amphinome, remarkable for its pair of foliate appendages to the head, which, however, did not contain the antennæ of the butterfly: this pupa was not distinguishable from other Nymphalidæ, and showed that the old authors who described it as having a belt of silk round the middle were mistaken.

Mr. Burmeister also mentioned that he had found the larvæ of Castnia in the bulbs or swellings at the foot of the stem of Orchids.

Mr. Edward Sheppard read the following extract from a letter written by Mrs. Russell, of Kenilworth,—the beetle referred to being a Meloe:—

"An evening or two ago I watched a beetle for an hour in the garden excavating a hole in the earth of one of the beds, big enough to hold its own large long body. It was evidently a female, full of eggs. It bit off little pellets of earth from the rim of its hole and cast them away with its hind feet, turning itself about in every direction, and working without a moment's cessation. It had very large, thick antennæ, and was plainly a very powerful creature, rolling down pieces of the dry crumbling earth half as big as itself, and not minding them a bit. Next morning I went to see the state of affairs, and found, to my astonishment, the excavation completely filled up and smoothed over, as if some one had passed their hand over the finely-powdered soil. Thinking it possible she might have buried herself, I searched the place well with a stick, but there was no trace of her, and I therefore conclude that she had been laying some eggs and covering them up."

Prof. Westwood gave an account of his observations of Ateuchus sacer at Cannes, and mentioned that during flight the elytra were perfectly horizontal and very slightly open at the suture, so that the motion of the wings was confined within very narrow limits. The action of the beetles in rolling along the ground the ball or pellet of dung in which the female deposits her eggs was most curious: with head pressed down and hind feet raised aloft, with its back to the pellet and moving backwards, one beetle pushed and guided the ball with its hind legs, whilst another beetle clung to the ball, and remaining motionless thereon was rolled over and over with it, sometimes uppermost, sometimes undermost. [See the account of Ateuchus variolosus given by "Ionicus" in 'The Entomological Magazine,' vol. iii. p. 377.]

Mr. Keays exhibited oak-leaves from Hornsey Wood, which were cut straight across the middle, leaving only the midrib, and the outer halves then twisted and rolled up by Attelabus Curculionoides, with a view to oviposition.

The Hon. T. De Grey exhibited specimens of Agapanthia Cardui, bred from larvæ in stems of thistles.

Mr. A. G. Butler exhibited Otiorhynchus picipes, which had been found destructive to rose trees at Manchester, eating off the young shoots.

Paper read.

The following paper was read:—"Descriptions of New Genera and Species of Heteromera," by Mr. Frederick Bates. Two new genera of Tenebrionidæ, from Australia, were characterized under the names of Hypaulax and Chileone.

New Part of 'Transactions.'

Trans. Ent. Soc., third series, vol. iv., part 5, published in May, completing that volume, and containing Mr. A. R. Wallace's Catalogue of Malayan Cetoniidæ, with four coloured plates, was on the table.

July 6, 1868.

H. W. Bates, Esq., President, in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' Nos. 101 and 102; presented by the Society. 'Journal of the Linnean Society,' Zoology, No. 41; by the Society. 'Proceedings of the Zoological Society,' 1867, Part 3; by the Society. Hewitson's 'Exotic Butterflies,' part 67; by W. W. Saunders, Esq. Newman's 'British Moths,' No. 19; by the Author. 'The Zoologist' for July; by the Editor. 'The Entomologist's Monthly Magazine,' for July; by the Editors.

The following additions, by purchase, were also announced:—Panzer, 'Faunæ Insectorum Germanicæ Initia.' Sturm, 'Deutschland's Fauna, Käfer;' vols. 9—22. 'Berliner Entomologische Zeitschrift,' 1857—67.

Exhibitions, &c.

Mr. M'Lachlan mentioned that, out of twenty-one pupæ of Hypercallia Christierninana, he had bred nineteen of the perfect insect, and exhibited a dozen of them. The pupæ soon lost the beautiful bright green colour (*ante*, p. xxiv.), became for a time pale dirty yellow or colourless, and finally assumed a rosy hue as the wings of the imago made progress towards their full development.

Mr. H. J. S. Pryer exhibited a specimen of Halias quercana, from West Wickham, with the wings unequally developed, one side being much shorter than the other.

Mr. Bond exhibited varieties of Setina irrorella and Arctia villica: the former was captured near Croydon; its colour was pale, the ordinary rows of dots were very indistinct, but there was a dark basal longitudinal mark, and a strong subapical dark fascia: the latter was bred from one of a number of larvæ found at Wormwood Scrubs, all of which were similarly treated, and, whilst the rest produced moths of the ordinary type, the specimen exhibited was almost entirely of a deep rich fulvous colour, with a few black marks on the costa of the fore wings, and but for its origin being known could scarcely have been recognized as Arctia villica.

Mr. R. Davis, of Waltham Cross, Herts (who was present as a visitor) exhibited a large collection of larvæ of Lepidoptera, admirably dried and preserved, and expressed his desire to receive living larvæ from Lepidopterists in other parts of the country, a portion of which, when preserved, he would return to the sender.

Mr. T. W. Wood (who was present as a visitor) exhibited specimens and drawings of several exotic species of Saturniidæ, and made some observations on their habits. Saturnia Cynthia was remarkable for its attitude during repose, the wings being held perfectly horizontal, without any external support, and widely expanded, the hind wings being an inch or more apart. The attitude of S. Promethea and S. Cecropia was very similar to that of a Papilio, and there were other strongly-marked points of resemblance between the Saturniidæ and Papilionidæ, both in form and habits; for instance, the gentle waving up and down of the wings, as if for display, as observed in these moths, was more characteristic of diurnal than of nocturnal Lepidoptera: he had kept a pair of S. Polyphemus alive for a considerable time, and found that they sometimes (particularly the female) rested after the manner of butterflies, but at other times their wings were horizontal, a large portion of the hind wings, including the ocellus, being hidden by the fore wings. Mr. Wood had also observed that these insects possess a moveable appendage on the under side of the anterior tibiæ, which is used as a comb for cleaning the antennæ: he had many times seen the males of S. Promethea use these appendages for that purpose; the large feathery antenna was clasped at the base between the tibia and the comb, as between a finger and thumb, and was drawn slowly through to the tip, being thereby effectually cleared of all dust and scales or other foreign matters.

Prof. Westwood said that there was a similar appendage or plate on the fore tibiæ of Papilio Machaon.

Mr. A. G. Butler (who was present as a visitor) exhibited Halia Vavaria and its Dipterous parasite, a species of Tachina, bred from the pupæ.

Mr. Bond, after referring to the cases recorded in Proc. Ent. Soc. 1865, pp. 103, 104, of several males of Œceticus and Micropteryx being discovered in simultaneous sexual contact with one female of their own species, mentioned that Dr. Knaggs had met with a still more remarkable case, inasmuch as he had found a male of Tortrix viridana and a male of T. heparana in contemporaneous union with a female of T. viridana.

Mr. Bond then exhibited a female of Drilus flavescens,—the third known British specimen of that sex (*vide ante*, p. i.),—and two males of the same species, the trio having been captured *in copulâ simultaneâ* near Freshwater, Isle of Wight, on the 12th of June, 1868, by Mr. H. Rogers, who had supplied the following account:—

"I captured them on Friday, the 12th of June, at a place called Blackbridge, Freshwater: they were on the high road, and first attracted my attention through the female crawling along and dragging both males behind her. I picked them up and closely examined them, and both males were *in cop.* with her at the same time, and remained so for upwards of two hours; both left her within ten minutes of each other. When I first saw them the males were quite helpless."

Mr. J. Jenner Weir exhibited a fine large Monochamus, which had flown into and been captured in the London Custom House a few days previously.

Mr. Blackmore exhibited a collection of insects of all orders, captured in Tangier in March and April, 1868. The greater part consisted of Coleoptera, in which Tangier was very rich: during three years Mr. Rolfe had collected there 2700

species, two-thirds of which had not previously been taken in Morocco, and of these a large proportion were new to Science.

The Secretary read Reports, dated 2nd December, 1867, 4th January and 22nd April, 1868, by Dr. Bidie, the Government Commissioner for investigating the ravages of the borer (*Xylotrechus quadripes* of Chevrolat) in the coffee-plantations of Mysore and Coorg. (See Tr. Ent. Soc. 1868, p. 105; Proc. 1867, p. cix., 1868, pp. ii., xviii.) The following are extracts:—

"In the neighbourhood of Mercara, my attention was directed to another insect called the Ringer: it chiefly attacks young plants, and lives in the ground at the foot of the stem, coming up during the night and feeding on the bark. When a complete circle of bark is thus destroyed, the whole of the plant above that point dies, but the root throws up shoots which in time become productive. The Ringer seems identical with the black grub of the Ceylon plantations, which is the larva of the Dart Moth. I have failed to get the grub to pass into the imago state, the shaking during my travels having always proved fatal to it, but am quite sure that it is identical with the English Agrotis segetum.

"In a native garden in Veerajpettah I found twenty-year-old stems in which the borer had been observed at work for five years at least, and various Coorgs have informed me that they have noticed the borer occasionally during the last eight or ten years. Two gentlemen engaged in planting have also told me that they now and again found the borer in coffee trees upwards of four years ago. In many of the native gardens I find that some Rodent (probably the coffee rat) has begun to destroy the pupa and beetle, by cutting down and extracting them for food. Red ants also to a small extent prey on the larva and pupa.

"I am now trying to discover whether the white borer did or does exist in indigenous trees.

"In Southern Coorg I have inspected thirty-eight estates belonging to Europeans, and a large number the property of natives. The effect of forest clearance on climate and its bearing on the immediate matter of my enquiry have received due attention. I quite agree that the destruction of forests in Coorg has had an influence in making the borer so prevalent and destructive to coffee. In other countries, such as America, as the clearing of the natural forests has gone on, insects destructive to trees and crops have vastly increased in numbers. In dense primeval woods, the conditions of light, heat and moisture are not favourable for the production of many of the insects injurious to cultivated plants; and besides Nature in such situations maintains enemies sufficient to keep them in check. When man comes in with his axe he disturbs this natural balance, and his fields and gardens suffer in consequence. No doubt also insects often attack cultivated plants when natural ones on which they used to subsist have been exterminated. Forest clearance would also seem to increase the number of many kinds of insects by producing various changes in local climate conducive to their multiplication. The Coorgs think that the borer used to live in the bamboo, but, owing to the death of that tree throughout the district during the past year, it was no longer able to subsist in it, and has therefore attacked the coffee. This general dying out of the bamboo, they say, occurs once in sixty years—that being the term of its existence; but it seems strange that all the bamboos in Coorg should be so exactly of the same age as to perish in a single year. I am investigating

these statements, however, and will soon be in a position to say positively whether or not they are founded on fact. Some think that the borer has increased from the destruction or departure of insect-eating birds, consequent on the cutting down of forest. Any one accustomed to jungle life knows that very few birds exist in dense forest, and that if not disturbed they rapidly increase wherever there is a clearing under cultivation. The comparative scarcity of birds in Coorg is doubtless caused by the great amount of dense forest that exists, the severity of the monsoon, and the destructive propensities of the Coorgs.

"In various jungle trees and in the orange I have found larvæ which in appearance and mode of tunnelling have a strong resemblance to the coffee-borers, but, as a rule, they differ from them in preferring dead to living wood. These and the coffee-borers are all the larvæ of beetles or of moths. The white coffee-borer (now so destructive) appears to belong to the genus Clytus.

"Since my last Report, I have found in coffee on native estates growing under shade a small beetle belonging to the genus Tomicus, which bores the young primaries and secondaries, causing them to turn black and perish. The perfect insect is only about the size of a pin's head, and yet it does a great deal of damage to the young fruit-bearing wood. I have also seen on some estates a locust very destructive to the foliage of the coffee, and thus causing a considerable loss in crop.

"The discovery of measures to destroy or prevent the appearance of the borer has of course formed the chief object of my solicitude, and although the peculiarities of its natural history are such as to throw serious obstacles in the way, still I hope to attain ultimately some measure of success. The fact of the insect being found in the perfect form in every month of the year nearly precludes the idea of being able to destroy it in the winged state; and the circumstance of its living as a grub and pupa in the interior of the stem renders it very difficult to attack it in either of these stages without destroying the tree. In the mean time I would recommend the covering of the stems of the plants with clean fresh moss up to the terminal pair of primaries from the surface of the ground. The moss should be about two inches in thickness and secured with several bands of fibre, and if put on about the beginning of the monsoon will live and become firmly banded round the stem in a short period, forming a mechanical barrier that would prevent the beetle from reaching the bark to deposit its eggs. The mossing would no doubt to some slight extent affect the health of the tree, but this would be largely compensated for by the protection that it would afford from so deadly an enemy as the borer. I believe, too, that although the eggs of the borer were deposited under the moss, its presence would prevent them from hatching. The manner of applying the moss here proposed is exactly the same as that recommended by Mr. M'Ivor for the cinchonas, to increase the amount of alkaloids in their bark. Coal-tar, pure or diluted with fish-oil, applied to the stems will also have the effect of keeping away the beetles, its smell being most offensive to all insects. I lately saw some trees to which tar had been applied nine months ago, and although exposed to the monsoon the coating had not lost its odour, and the trees looked very vigorous. I mention these facts because it has been said that the tar soon loses its smell, and is also fatal to the coffee-tree. Lime-wash has been used on some estates, but the great objections to its use are that it is washed away by the first showers and scales off when the tree is shaken by the wind. I believe a mixture of

cow-dung and clay, like that used by the natives for the walls and floors of their houses, would be more permanent and perhaps as effectual, while it would be much cheaper.

"The coffee crop has turned out better than was anticipated, and this agreeable surprise has led most planters to take a much more hopeful view of the future. I am happy to report, too, that the borer does not seem to be on the increase in South Coorg, but rather on the decline, as in most bored trees about five per cent. of the insects found are dead. Still it is very difficult to arrive at a satisfactory conclusion as to the state of the pest at present, as the insect is for the most part in the winged state and not easily seen, and it is only as the dry weather begins to tell on the trees that those tunnelled will show symptoms of the injury they have sustained. The Rodent alluded to in my last continues to prey on the insect, cutting a hole in the wood so as to reach its tunnel. It does not appear, however, to frequent estates of large extent and free exposure, but to live in native gardens of limited size, in which there is some shade and abundance of cover in the shape of under growth."

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"There is a very destructive insect called by planters the charcoal borer, as it frequently destroys the charcoal trees which are reared to give shade to the coffee. Its presence in a tree is indicated by a lump on the stem of sawdust-like wood-powder, matted together by silky fibres. On removing this the hole through which the insect enters and ejects the morsels of wood will be seen, and it is generally large enough to admit the tip of the little finger. If the tree be now cut down and split open, tunnels of the same size will be found running upwards and downwards from the external opening, and the grub lying snug in the bottom of a burrow at the base of the stem. The larva is from three to four inches long, thick, fleshy, and of a pale red colour. It has six pectoral, eight ventral and two anal feet, and is a very powerful creature, struggling violently in the hand, and attacking vigorously with its powerful jaws the cork of a bottle in which it may be confined. The chrysalis is smaller and of a darker red colour than the caterpillar, and rests about three months. Its abdominal segments are furnished with transverse rows of minute reflexed spines, and some weeks before the moth emerges, moved by some wonderful instinct, it pushes itself up by means of these, and clears away the *débris* of the wood from the external opening, so that there may be nothing to prevent the escape of the perfect insect. Having completed this task it once more descends to its former place, and rests until the moth arrives at maturity, when the same contrivance is made use of again to enable the moth to escape from the tunnel, within which it could never wriggle out of its case or develope its wings. The moth measures about three and a half inches across the upper pair of wings, which are much larger than the lower. Both pairs are of a grayish brown colour, and the upper ones are clouded with brown. The antennæ of the female (I have not seen a male) are very short and filiform. The wings are deflexed in repose, and furnished with a complicated series of strong nerves. The abdomen is elongated, and the female, when touched, discharges with considerable force immense numbers of minute white round eggs, which shortly turn black, when they have the appearance of very fine gunpowder. This moth belongs to the family Hepialidæ, and is closely allied to the Hepialus humuli, or ghost moth of England. It is very common in the

charcoal tree, and renders the stem so weak by its tunnelling that it is apt to be broken by the wind. In the monsoon, too, the rain enters by the exterior opening, gets to the heart of the tree and causes it to rot. The larva may be killed by passing a flexible wire into its burrow, and after this the hole should be closed with a soft wooden peg.

"There is not a tree in our forests but is liable when dead to the attacks of boring insects, and many in the living state, more especially if sickly, show traces of their depredations. As regards the coffee-plant, any diminution of vigour in it, no matter what the cause, renders it liable to the ravages of the borer, and the larva does not find a suitable field in a vigorous and absolutely healthy plant. There seems no reason to doubt, therefore, that one cause of the great prevalence of the borer of late years has been a general want of vigour in the plants. At the same time it must be stated that a vast majority of the trees that have died full of the borer's tunnels would, but for its ravages, have lived and might have been restored to a more healthy state. The causes that produced this sickly condition were various, and some of them must have been very general, seeing that the borer has prevailed over such an extent of country. Not only in the actual coffee districts, but in places at a considerable distance from them—such as Hassan and Hoonsoor—I have found the borer present in coffee trees; occurrences that point to the reduction of vigour having been caused in part by some climatic influence. From this and other facts I also infer, that the borer beetle is a widely distributed insect, and indigenous to the country, as the distance of the stations of Hoonsoor and Hassan from estates infested with the borer, and the open nature of the intervening country, preclude the idea of its having been able to wing its way from the latter to the former. I cannot believe either that the ova of this beetle could have been carried so far by man's or any natural agency. Concluding then that the borer beetle belongs to the insect Fauna of Southern India, and is widely distributed, it can hardly be expected that it will ever disappear, and although more favourable seasons and change of mode of cultivation may render coffee in general less liable to, or proof against, its attacks, still it will ever be ready to prey upon and destroy sickly plants. During a recent visit to the gardens on the Baba-Booden, in which coffee was first cultivated in Southern India, I was informed by the planter Ghaus Sha-Khadry that 'he had known the borer there for thirty years.' On an estate in Nugur, too, in 1860, or eight years ago, no less than 60,000 plants were destroyed by the borer. These facts also go to prove that the insect is an old and permanent resident in the coffee districts of the Peninsula. When at Ghaus Sha-Khadry's plantations I saw coffee-plants growing in shade, seventy years old, and quite healthy, and was told that about twelve years ago there were plots of coffee in the open, the trees in which were one hundred years old. These have all since gradually died out, and the owner attributes their death to extreme age, drought and borer. He says that for twelve years back the seasons have gradually been getting drier and hotter, until at the present time the climate is such as to render it impossible to grow coffee trees in the open in that part of the country: there is much collateral evidence to support this statement regarding gradual deterioration of climate all along these Western Ghauts.

"I have visited the chief estates in Munzerabad, and a few of the oldest and most interesting in Nugur. In both these districts, all the planters I have seen are of opinion that coffee must in that quarter be cultivated under shade, trees in the open

being liable to perish from the violence of the monsoon, drought, borer, &c. The most of the estates therefore are under shade, and as those so protected have suffered but little from the borer as compared with the few in the open, I went over them with great interest. The degree of shade is a point of great nicety and importance, too much being prejudicial to the reproductive powers of the tree, and too little exposing it to the effects of drought and the attacks of the borer. The native cultivators were the first to adopt this system, and there seems no doubt that they were led to do so by experience. It is worthy of note, too, that the first English coffee planters in Southern India followed their example, and that some of their estates, varying in age from twenty-five to forty years, still yield large and certain returns to the owners. On the whole, I entertain a very high opinion of the system of culture under shade, and think it might be introduced with advantage in many parts of Coorg."

Mr. M'Lachlan mentioned that the terrestrial Trichopterous larvæ exhibited at the previous Meeting (*ante*, p. xxiv.), from which he had hoped to breed Enœcyla pusilla, had unfortunately perished.

Mr. A. E. Eaton exhibited numerous drawings and microscopical preparations of the mouth and other parts of Cænis, Leptophlebia, Ephemerella and Oligoneuria—with reference to the paper mentioned below.

Prof. Westwood exhibited two remarkable forms of Chalcididæ, one from the Amazons, the other from Australia, both belonging to the Cleonymus group, and possessing peculiar modifications and elongation of the abdominal segments, whereby doubtless oviposition was facilitated. He proposed to describe each of them as the type of a new genus; see below.

Mr. F. Smith exhibited two female specimens of Ophion macrurus (Drury, Exot. Ins. i. pl. xliii. fig. 5), bred by Mr. Chapman, of Glasgow, from cocoons of Saturnia Cynthia, which he had received from Mr. Angus, of New York. The specimens were alive when they reached Mr. Smith, and one of them stung him in the hand so severely as to lead to the belief that poison was injected, but fortunately the pain was not lasting. There were specimens of this Ichneumon in the British Museum from New York, with a memorandum by Edward Doubleday "parasitic on Bombyx Cecropia," a North American species: if there were no mistake as to the species from which the exhibited insects were bred, it was remarkable that the Asiatic Bombyx Cynthia should, so soon after its introduction into America, have been attacked by the parasite of its congener B. Cecropia.

Mr. F. Moore did not consider that these parasites were restricted to a single species. There was no doubt of the true Bombyx Cynthia having been introduced into America; and he had himself bred the same species of Ophion from B. Cynthia and B. Polyphemus.

The Secretary exhibited a spring wooden letter-clip, in the cavity between the limbs of which was placed the nest of a wasp, probably an Odynerus. This was found in June, in Hants, in a box which lay open on a writing-table which was in constant use, though the clip had remained untouched; and was communicated by Sir J. Clarke Jervoise, Bart., M.P.

The Secretary mentioned that petroleum oil, especially in the crude state, had in France been found of great use in destroying insects: the petroleum was mixed with water, in the proportion of an ounce to half an ounce to a pint of water, but when

applied to fruit trees or delicate plants the quantity of oil was still less: a very weak solution applied with a watering-pot, was said to be very efficacious against the larvæ of the cockchaffer; and a strong solution, poured into the holes and down walls infested by insects, was said to kill them rapidly. Another application of the solution was to rid dogs and other animals of parasites; but the parts must be rubbed with soap a few minutes after the solution was applied.

Papers read.

The following papers were read:—

"Descriptions of new Genera and Species of Heteromera" (conclusion); by Mr. F. Bates.

"On the Larva of Micropeplus Staphylinoides;" by Sir John Lubbock, Bart.

"On some points in the Anatomy of the immature Cænis macrura of Stephens;' by Mr. A. E. Eaton.

"A Tabular Comparison of some Representative Species of Diurnal Lepidoptera in Europe, India, and North America;" by Mr. W. F. Kirby.

"In my paper on the geographical distribution of European Rhopalocera (Tr. Ent. Soc. 3rd series, i. 481), I did not attempt any generalizations from the results arrived at. It now appears to me that a Table showing the species common to Europe and India, or North America, may be useful, with reference to the claims of representative forms to be considered distinct. In some cases, as in Papilio Zelicaon, a named representative is now allowed to be a variety; in others, as in Pyrameis Callirrhoe, it is considered as indubitably a species. But my object is simply to start inquiry; I leave to others the decision of specific claims. A great number of European species range through North Asia (those common to Europe and North Asia are indicated in the Table by an asterisk), and I think it highly probable that many or most of these will ultimately be found to extend to the north slope of the Himalayas. The absence of continuous mountain chains running north and south will account for their wide distribution over Europe and North Asia. The South Indian Fauna is still very imperfectly known, but it is probably more African or Australian in character, and much poorer in species, than that of the North. My authorities for North Asia are Ménétries and Bremer; for India, Horsfield and Moore's Catalogue, and subsequent papers by Mr. Moore; and for America, Morris's Synopsis, published by the Smithsonian Institution. The letters N, S, E, W denote the points of the compass: H in the Indian column indicates a Himalayan species.

Europe.	India.	North America.
*Papilio Machaon	P. Machaon (H)	P. Zelicaon (W)
*Pieris Brassicæ	P. Nipalensis (N)	
„ Krueperi	P. Gliciriæ	
* „ Rapæ	P. Rapæ (N)	P. Cruciferarum
* „ Callidice	P. Kalora (H)	P. Callidice? (W)
* „ Daplidice	P. Daplidice (N)	
Anthocharis Belia		A. Belia (W)
* „ Tagis	A. Daphalis (H)	
*Colias Pelidne (N)		C. Pelidne (N)
* „ Nastes (N)		C. Nastes (N)

Europe.	India.	North America.
Colias Phicomone		C. Phicomone
* „ Hyale	C. Hyale	C. Hyale
* „ Erate	C. Erate (N)	
* „ Chrysotheme (E)		C. Eurytheme
„ Hecla (N)		C. Hecla? (N)
„ Myrmidone (N)	C. Myrmidone? (H)	
* „ Edusa	C. Fieldii (H)	C. Amphidusa (W)
*Gonepteryx Rhamni	G. Nipalensis (H)	G. Rhamni (W)
Danais Chrysippus (E)	D. Chrysippus	
*Argynnis Aphirape		A. Aphirape (N)
* „ Freya (N)		A. Freya (N)
* „ Polaris (N)		A. Polaris (N)
„ Chariclea (N)		A. Chariclea (N)
„ Lathonia	A. Issæa (N)	
* „ Aglaia		A. Aglaia
* „ Selene		A. Myrina
„ Frigga (N)		A. Frigga (N)
*Grapta C-album		G. Comma
*Vanessa Xanthomelas	V. Xanthomelas (H)	
* „ V-album		V. J-album
* „ Urticæ	V. Kaschmirensis (N)	V. Milberti
* „ Antiopa	V. Antiopa (N)	V. Antiopa
Pyrameis Atalanta	P. Callirrhoe (N)	P. Atalanta
* „ Cardui	P. Cardui	P. Cardui
*Neptis Aceris (E)	N. Aceris	
Lasiommata Mæra	L. Schakra (N)	
„ Menava	L. Menava (N)	
Hipparchia Thelephassa (E)	H. Baldiva (H)	
Epinephele Janira	E. Cheena (H)	
* „ Lycaon	E. Davendra (H)	
Cœnonympha Pamphilus		C. Inornata (W)
* „ Davus		C. Davus (W)
*Chionobas Jutta (N)		C. Jutta (N)
„ Taygete (N)		C. Taygete (N)
* „ Also (N)		C. Semidea (N)
„ Polixenes (N)		C. Polixenes (N)
*Thecla Rubi		T. Dumetorum (W)
*Chrysophanus Phlœas	C. Timens	C. Americanus
* „ Dorilis		C. Epixanthe
Polyommatus Bæticus (S)	P. Bæticus	
* „ Tiresias (S)	P. Tiresias	
* „ Argiolus		P. Pseudargiolus
„ Optilete		P. Filenus
* „ Semiargus		P. Xerces (W)
„ Ægon		P. Antægon (W)

Europe.	India.	North America.
*Polyommatus Amandus		P. Icarioides (W)
„ Pheretes		P. Pheres (W)
„ Lysimon	P. Lysimon	
*Pamphila Sylvanus		P. Sylvanus (W)
„ Comma		P. Comma (W)

" It will be noticed that whenever a European genus occurs in India or North America at all, European species, or very closely allied forms, are also to be found in those countries. South or East European species frequently extend to India, North European species frequently reach America, while Central European species extend throughout North Asia, and only in a few instances reach North America, and are then usually confined to the West coast. Indeed almost every species common to the Old World and North America is either Polar or Californian.

" There is still considerable doubt whether the European species of Colias, &c., which are reputed North American do actually occur there, or whether allied species may not have been mistaken for them. It is also asserted, but I believe without authority, that the common Vanessæ have been introduced into North America; but this is highly improbable, as they are all wide-ranging insects, and do not feed on garden plants.

" Pieris Brassicæ is replaced by P. Cheiranthi in the Canaries, and by P. Brassicoides in Abyssinia. P. Rapæ has been lately introduced into Canada. May not Anthocharis Creusa be an American variety of the widely distributed and very variable A. Belia? A. Ausonia is the only variety of Belia which I know to occur in America; does it, or any other variety of this species, occur in North Asia? Gonepteryx Cleopatra appears distinct from G. Rhamni. Is G. Cleobule, from the Canaries, distinct from G. Cleopatra? The European Colias Myrmidone is very distinct from C. Edusa; I doubt the occurrence of the true Myrmidone in India. Perhaps the intermediate Indian form may indicate that these two should be united, as Parnassius Apollo and P. Delius, though perfectly distinct in Europe, appear to blend completely into each other in Siberia. Is Lasiommata Menava sufficiently distinct from L. Hiera? Hipparchia Baldiva has been erroneously placed in the genus Lasiommata or Amecera. Polyommatus Bæticus and Telicanus are among the very few species common to Europe and South Africa; P. Pheretes is represented in North-East Asia by the *var.* (?) P. Pheretiades."

" Descriptions of new Genera and Species of Chalcididæ." By Prof. Westwood.

" The following species of Chalcididæ are remarkable for their gigantic size in comparison with the great majority of the family to which they belong, and for the singular modification in the structure of several of their important organisms.

Pelecinella, nov. gen.

Callimomi affine. Corpus ♀ longissimum, fere filiforme. Caput subglobosum. Antennæ thoracis longitudine, 11-articulatæ, articulis 2do et 3o minutis, 4to longo subcompresso, reliquis sensim decrescentibus. Collare capite duplo longius, valde angustatum. Abdomen longissimum, gracillimum, segmentis 2do et 3o parum crassioribus, reliquis compressis; apice lobis 2 magnis foliaceis terminato. Oviductus

exsertus, fere abdominis longitudine, curvatus. Alæ anticæ ramo stigmatico fere punctiformi. Pedes 4 antici graciles; 2 postici apice tibiarum et articulo basali tarsorum dilatatis.

Pelecinella phantasma, n. sp.

P. nigra, abdomine chalybeo, punctulata; collaris lateribus rufis, abdomine nitido, pronoto, metanoto et petiolo transverse striatis, segmento sequente purpureo; alis translucidis; tarsorum posticorum articulis 4 apicalibus albis. Long. corp. lin. 12; exp. alar. lin. 7½. Hab. ad ripas flum. Amazonum (D. Bates). In Mus. Hopeiano Oxoniæ.

Thaumasura, nov. gen.

Cleonymo et *Epistenice* affine. Antennæ graciles, 11-articulatæ; articulo 2do mediocri, 3o minuto, 4to longo, reliquis sensim attenuatis. Thorax subovalis. Abdomen segmentis 5 basalibus brevibus, massam ovalem fingentibus, 2 apicalibus gracillimis, tubulum capite et thorace duplo longiorem pro receptione oviductus formantibus. Alæ anticæ ramo stigmatico brevi, apice furcato. Femora compressa, tarsi simplices. Oviductus abdomine a 4ta parte longior.

Thaumasura terebrator, n. sp.

T. purpureo-chalybea, punctata, metathoracis lateribus et abdominis basi cupreo tinctis, antennarum articulis intermediis pedibusque rufis; alis anticis substigmate fusco, parum nebulosis; abdominis segmento 6to 5 præcedentibus simul sumptis longitudine æquali, 7mo longiore et tenuiore; tibiis posticis curvatis, serrulatis. Long. capitis thoracis et segm. 5 basal. abdom. lin. 5; segm. 2 apical. abdom. lin. 7; exp. alar. lin. 9½. Hab. in Australasiæ part. austral. In Mus. Hopeiano Oxoniæ (olim nostro).

Solenura, nov. gen.

Thaumasuræ affine. Antennæ capite vix duplo longiores, 11-articulatæ, apicem versus paullo crassiores, articulo 2do parvo, 3o minuto. Corpus breve, compactum. Abdomen segmentis 3 basalibus massam elongato-ovalem thoraci longitudine æqualem formantibus, reliquis tubulatis, 4to 3 basalibus simul sumptis longitudine æquali, cylindrico, 5to præcedente duplo breviore, 6to 4 basalibus simul sumptis æquali, 7mo minuto. Terebra paullo ultra abdominis apicem extensa. Pedes breves, simplices.

Solenura telescopica, n. sp.

S. chalybea, punctatissima, abdomine purpurascente, segmentis 3o et sequentibus carina media distinctis; antennis nigris, pedibus obscure rufis; alis immaculatis. Long. capitis thoracis et segm. 3 basal. abdom. lin. 4; segm. 4 apical. abdom. lin. 7; exp. alar. lin. 7. Hab. Java (D. Horsfield?). In Mus. Hopeiano Oxoniæ.

Eucharissa, nov. gen.

Eucharidi affine. Caput transversum, antice dense lanatum. Antennæ capite duplo longiores, 16—22-articulatæ, serratæ. Thorax subglobosus. Abdomen brevissimum, petiolo brevi. Pedes breves, simplices.

Obs.—Inter turbam innumerabilem *Chalcididarum* hoc genus antennis multiarticulatis unice gaudet.

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Eucharissa speciosa, n. sp.

E. antennis 22-articulatis, nigris; capite et thorace læte viridibus, hoc transverse striato; abdomine et pedibus luteis, femoribus et petiolo obscurioribus; alis pallide fuscescentibus. Long. corp. lin. 4; exp. alar. lin. 10. Hab. ad Caput Bonæ Spei. Mecum communicaverunt DD. Klug (*Eucharis speciosa*, Klug, MS.) et Spinola.

Eucharissa Natalica, n. sp.

E. antennis 16-articulatis, nigris; ænea, areolato-punctata; abdomine nigro, nitido, postice luteo, pedibus albidis, femorum basi fusca. Long. corp. lin. 2½; exp. alar. lin. fere 6. Hab. in Natalia. In Mus. Hopeiano Oxoniæ (olim nostro)."

November 2, 1868.

H. W. Bates, Esq., President, in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' No. 103; presented by the Society. 'Transactions of the Linnean Society,' Vol. xxvi. Part 1; 'Journal of the Linnean Society,' Zoology, Nos. 42 and 43; by the Society. 'Proceedings of the Zoological Society,' Index, 1848—1860; and 1868, Parts 1 and 2; by the Society. 'Journal of the Royal Agricultural Society,' Second Series, Vol. iv. Part 2; by the Society. 'Annales de la Société Linnéenne de Lyon,' N. S., Tome xv., 1867; by the Society. 'Bulletin de la Société Impériale des Naturalistes de Moscou,' 1867, Nos. 3 and 4; by the Society. 'Berliner Entomologische Zeitschrift,' Vol. xii. Parts 1 and 2; by the Entomological Society of Berlin. 'Stettiner Entomologische Zeitung,' 1868, Nos. 7—9; by the Society. 'Journal of the Quekett Microscopical Club,' Nos. 1—3; by the Club. Hewitson's 'Exotic Butterflies,' Part 68; by W. W. Saunders, Esq. 'Coleopterologische Hefte,' herausgegeben von E. v. Harold, ii. and iii.; by the Editor. Newman's 'British Moths,' Nos. 20—23; by the Author. 'The Zoologist,' August to November; by the Editor. 'The Entomologist's Monthly Magazine,' August to November; by the Editors.

The following additions by purchase were also announced:—Schiner, 'Diptera der Novara Reise.' Redtenbacher, 'Coleoptera der Novara Reise.' Tournier, 'Description des Dascillides du Bassin du Léman.' Gerstäcker, 'Bericht der Entomologie während der Jahre 1865 und 1866.' 'Catalogus Coleopterorum hucusque descriptorum Synonymicus et Systematicus;' autoribus Dr. Gemminger et B. de Harold; Tom. i., Cicindelidæ, Carabidæ. F. Walker, 'Catalogue of Heteropterous Hemiptera in the British Museum,' Parts 1 and 2; 'Catalogue of Blattariæ in the British Museum.' A. G. Butler, 'Catalogue of Satyridæ in the British Museum.'

Exhibitions, &c.

The President exhibited specimens of Vanessa Urticæ and Zygæna Filipendulæ from the Isle of Man, remarkable for their small size. The following note by the captor, Mr. Edwin Birchall, was read:—

"I captured about twenty specimens of Vanessa Urticæ in the Isle of Man in June last, all of the same diminutive size as the examples sent for exhibition. The outline of the wings is more angular than in English specimens, the black spots either larger in proportion, or in the case of the two spots in the centre of the fore wings, actually larger in the small insects from the Isle of Man than in the large English ones, the variation from the typical form being thus exactly the reverse of what occurs in the Corsican subspecies Ichneusa, in which these spots are altogether wanting. Whether some accidental cause has dwarfed the insects, or that we have here a distinct insular variety, and the opportunity, as it were, of watching the origination of a new species, future inquiry must decide. Zygæna Filipendulæ also occurs in a very dwarfed condition: this I have observed both in 1867 and 1868, and the specimens exhibited are certainly the ordinary condition of that insect in the island. I hope entomologists who may visit the Isle of Man will collect other common species found there, as well as the rare ones for which it has become celebrated, that a wider basis for generalization than at present exists may be obtained."

Mr. F. Smith inquired whether Vanessa Urticæ was always thus dwarfed in the Isle of Man, or whether the smallness was one of the effects of the peculiarly hot season of 1868? He believed that during the past season many Hymenoptera had been observed in a dwarfed condition.

Mr. J. Jenner Weir had noticed that the common white butterflies of the past season were unusually small.

Prof. Westwood remarked that the diminutive size might perhaps be due to the heat, and the consequent rapidity of development of the insects, which remained a shorter time, and therefore ate less, in the larva state.

Mr. R. L. Davis (who was present as a visitor) mentioned that he had a number of pupæ of Smerinthus ocellatus of very small size: the larvæ had scarcely attained more than half their usual growth when they were driven into the pupa state by the frost destroying their food. According to his experience, scarcity of food was generally the cause of smallness. During the season of 1868 he had preserved for the cabinet larvæ of about sixty-five species of Lepidoptera, most of which (including some of the diminutive Smerinthus ocellatus) were exhibited.

Mr. S. Stevens exhibited a specimen of Chœrocampa Celerio captured at Brighton by Mr. Swaysland, on the evening of the 20th of September, hovering over Verbena flowers; and a moth from the British collection of the late Mr. Desvignes, ticketted "immoraria, *Hub.*," which it was suggested was an extraordinary variety of Strenia clathrata.

The Secretary read a letter from Gunner John Wilson, of the Royal Artillery, Woolwich, stating that he had bred a gynandromorphous specimen of Lasiocampa Quercus: "it shows the chocolate wings and feathered antenna of the male on the left side; on the right the wings are buff, and the antenna is single as in the female, the abdomen thicker and not tufted as on the other."

Mr. T. W. Briggs (who was present as a visitor) exhibited a Leucania captured at Folkestone on the 15th of August, at sugar; a second specimen, much worn, was taken in the second week of October, within five yards of the same place. The insect appeared to differ from any species hitherto recorded as British.

Mr. H. Pryer exhibited a specimen of Scoparia Zelleri (*Wocke*), captured in the railway station at Norwood Junction, on the 17th of August, 1867. This was the first occurrence of the species in Britain; but the capture of a second specimen is announced in the 'Entomologist's Monthly Magazine,' vol. v. 131.

Mr. G. S. Mosse exhibited a collection of insects from the State of New York: they were principally Lepidoptera, and amongst them was a female of Papilio Turnus, which, contrary to the usual habit, was coloured like the male.

Mr. H. Pryer exhibited a specimen of Agrypnia picta (*Kolenati*), a new addition to the list of British Trichoptera. The insect, a male, was captured at a gas-lamp at Highgate, in June, 1868.

Mr. Frederick Smith read the following note:—"The Secretary has called my attention to the fact that the name Œstropsis, under which I described a new genus of Aculeate Hymenoptera in the 'Transactions' of the Society for the present year (Tr. Ent. Soc. 1868, p. 253), has been applied by Dr. Brauer, during the present year, to a genus of Trichoptera (Verh. zool.-bot. Gesells. Wien, 1868, vol. xviii. p. 263). As Dr. Brauer's paper was published before mine, I have now to propose for my new genus of Aculeata the name Gastropsis, from the resemblance which the insect bears to the Gastrus equi of Meigen, the Œstrus equi of old authors."

The President read a letter from Mr. Albert Müller, of Penge, to the following effect:—"As regards British galls, Mr. H. Waring Kidd, of Godalming, and I are jointly working at a descriptive list of all excrescences or deformations caused by insect agency on plants growing wild or cultivated in these islands; and for the guidance of such persons as may be willing to aid us, a list of such plants has appeared in the 'Entomologist's Monthly Magazine' for October. Foreign galls and their insects, as well as the economy of the latter, form the special study of the writer, who will at all times be happy to enter into correspondence with any one desirous to further the object in view, either by contributing specimens or by giving information of any kind: this pursuit is intended to lead, at some future time, to the production of a work similar to the one proposed by my late friend Mr. Wilson Armistead, of Leeds."

Mr. Roland Trimen sent (from the Cape of Good Hope) some sketches of an Orthopterous insect, respecting which he wrote as follows:—"It is sometimes found in gardens about Cape Town. The extraordinary development of the parts of the mouth, particularly of the labrum and mandibles, makes me think it may be allied to the Australian genus Anostostoma of G. R. Gray, with which, however, I am unacquainted. I imagine this Cape cricket to belong to the Gryllidæ; but as my specimen has no trace of wings, it is very probably only a larva, and may result in a member of the Achetidæ. I shall be very glad to hear anything that you can ascertain about this ugly fellow, especially if the special use of such formidable mouth-armature be known. I tried my captive with leaves, but he would not touch them."

Prof. Westwood said the insect was an Anostostoma, or was nearly allied thereto: it might be the species figured by Stoll. [See Charlesworth's Mag. Nat. Hist. vol. i. p. 143]

With reference to the plague of so-called "mosquitoes" at Plumstead and Wool-

wich, in the months of July and August, the Secretary mentioned that in the latter month he had had sent to him from Woolwich two insects, each of which was alleged to be the delinquent. The first was a golden-eye (*Chrysopa*)! The other was a veritable gnat, and was pronounced by Mr. F. Walker to be the Culex nemorosus, a species often troublesome in woods, though not usually found in houses. Mr. F. Smith added that specimens of the common house-gnat (*Culex ciliaris*) had been sent to the British Museum as "the mosquito."

The Secretary read a letter from Mr. R. W. Fereday, of Christchurch, New Zealand, requesting contributions of specimens, with a view to the formation of a collection of British insects for the Museum there; and a letter from Mr. H. L. Schrader, of Shanghai, containing observations on various insects (Agathia, Œceticus, Cerura, Actias, Syrphus, Psylla, &c.).

Papers read.

The following papers were read:—"Notes on some South-African Butterflies enumerated in Mr. A. G. Butler's Catalogue of Satyridæ in the British Museum;" by Mr. Roland Trimen.

"Contributions to a Knowledge of the European Trichoptera" (First Part); by Mr. R. M'Lachlan.

"Descriptions of new Genera and Species of Heteromera;" by Mr. Frederick Bates.

(See 'Transactions' for 1868, Part 4.)

New Parts of 'Transactions.'

The 'Transactions' of the Society for the year 1868, Parts 2 and 3, published in July and September respectively, were on the table.

November 16, 1868.

H. W. Bates, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Boston Society of Natural History,' Vol. xi., sheets 7—30; and 'Memoirs read before the Boston Society of Natural History,' Vol. i. Part 3; presented by the Society. 'Annals of the Lyceum of Natural History of New York,' Vol. viii. Nos. 15—17; by the Lyceum. 'Proceedings of the Essex Institute,' Vol. v. Nos. 5 and 6; by the Institute. 'Proceedings of the Entomological Society of Philadelphia,' Vols. ii., iii., and vi. Part 2; by the Society. 'Transactions of the American Entomological Society,' Vol. i. Nos. 1—4; by the Society. 'The Butterflies of North America,' by Wm. H. Edwards, Part 1; by the Author. Holmgren, 'Monographia Tryphonidum Sueciæ' and 'Monographia Ophionidum Sueciæ;' Curtis's 'Guide to an Arrangement of British Insects;' by J. W. Dunning.

Exhibitions, &c.

Mr. Bond exhibited a specimen of Tapinostola Elymi, captured on the Norfolk coast, near Yarmouth; a variety of Dianthœcia capsincola, bred in 1867 by Mr. Noah

Greening, at Warrington, having the wings on one side abnormally coloured; seven specimens of Polia nigrocincta, bred in 1868 by Mr. Greening, from larvæ found in the Isle of Man, and the carthern case in which one of the pupæ had been enclosed.

Prof. Westwood announced that the Leucania exhibited by Mr. Briggs at the previous Meeting (*ante*, p. xxxix.) had proved to be L. albipuncta, *W. V.*, a species new to the British list.

Mr. M'Lachlan read extracts from the 'Canadian Entomologist,' one recording the occurrence of Papilio Machaon in the Hudson's Bay Territory, the other relating to the naturalization in North America of Pieris Rapæ, which, recently introduced into Canada, had already spread southwards into Maine and Vermont.

Mr. Bond mentioned the occurrence of a swarm of beetles in Cambridgeshire. A correspondent, writing from Whittlesford on the 30th of September, 1868, said:—"Within the last few days, the road, the foot-path, the grass and the hedges from my house for about three-quarters of a mile, have been covered with them: there must be bushels of them, and although we have had showers, their numbers do not diminish." The species in question was Gastrophysa polygoni.

Mr. M'Lachlan exhibited larva-cases, and specimens of both sexes of the imago (winged males and wingless females) of Enœcyla pusilla, bred by Mr. Fletcher, of Worcester, an interesting addition to the list of British Trichoptera. The larvæ were terrestrial in their habits, feeding in mosses growing on the bark of trees, and had not any external respiratory organs.

Prof. Westwood exhibited drawings in detail of some remarkable forms of Hymenoptera. Amongst them were three new species of Trigonalys, two from the Amazons, one from Ceylon; a singular insect from the Amazons, the type of a new genus Nomadina; and a still more abnormal form from Hayti, to which the name Sibyllina ænigmatica was given, which Mr. F. Smith had regarded as an ant, Mr. Haliday as one of the Sphegidæ, whilst Prof. Westwood thought it more nearly allied to the Vespidæ; its long twelve-jointed filiform antennæ (in the female), notched or kidney-shaped eyes, the tri-lobed lower lip, and the flat wings (not folded longitudinally), seemed to connect it with the last-mentioned family. (See 'Transactions' for 1868, p. 327.)

Mr. F. Smith thought the insect had more characters in accordance with those of the ants than with those of any other family, and it certainly never occurred to him that it was a wasp. The notched eye was found in Mutillidæ and Trypoxylon; and there were none of the Vespidæ in which the prothorax was not continued down to the insertion of the wings, in which character Sibyllina agreed with the Sphegidæ.

December 7, 1868.

H. W. Bates, Esq., President, in the chair.

The Secretary announced the death of Prof. Boheman, an Honorary Member of the Society: he died at Stockholm on the 2nd of November, at the age of seventy-two years.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Annales de la Société Entomologique de France,' 1867; presented by the Society. 'Journal of the Linnean Society;' Zoology, No. 44; by the Society. 'Stettiner Entomologische Zeitung,' Vol. xxix. Nos. 10—12; by the Society. 'Memoires sur la Famille des Carabiques,' and twenty-six other Papers, by the Baron M. de Chaudoir; by the Author. 'Etudes sur la Parthénogenèse,' par Félix Plateau; by the Author. 'A short Campaign against the White Borer (*Xylotrechus quadrupes*, Chevrolat,) in the Coffee Districts of Coorg, Munzerabad and Nuggur,' by Lieut.-Col. C. P. Taylor; by the Author. Newman's 'British Moths,' No. 24; by the Author. 'The Zoologist' for December; by the Editor. 'The Entomologist's Monthly Magazine' for December; by the Editors.

The following additions, by purchase, were also announced:—'Genera des Coléoptères d'Europe,' livr. 137—144. 'Record of Zoological Literature,' 1867, (Entomological Part).

Election of Members.

A. G. Butler, Esq., of the British Museum, and Dr. F. Buchanan White, of Perth, were elected Members.

Exhibitions, &c.

The Secretary announced that an exhibition of bees would be held at Milan, from the 10th to the 13th of the month, and would comprise a collection of all kinds of bees, honey, and instruments and utensils employed in apiculture, for which various prizes would be distributed. A silver medal was also offered for the best mode of taking the honey without destroying the bees.

Mr. Bond exhibited two specimens of Limenitis Sibylla, negroes, entirely black on the upper side; and three specimens of Polyommatus Adonis, one of which, a male, was remarkable for its extremely small size, another bore on the under side of the fore wings a number of broad bars of black, whilst the third, a female, was partly coloured like the male, the upper surface of the wings being dashed with bright blue, not shading off into the brown, but clearly and sharply defined.

Mr. Bond also exhibited the gynandromorphous specimen of Lasiocampa Quercus bred by Mr. Wilson, and mentioned at the Meeting of November 2nd (*ante*, p. xxxviii.).

Mr. Dutton exhibited a Catocala Fraxini, captured in an empty house at Eastbourne in August last.

Mr. Edward Saunders sent for exhibition a specimen of Crambus myellus (*Hübner*), a species new to Britain. It was found by Mr. N. E. Brown, on a blade of grass, near Aberdeen, in July last; and was nearly allied to C. pinetellus.

Prof. Westwood exhibited drawings, and read descriptions, of several exotic Hymenoptera belonging to the genus Aulacus. (See 'Transactions' for 1868, p. 327.)

Paper read.

A paper "On the Application of the Law of Priority to Genera in Entomology," by Mr. W. F. Kirby, was read by the Secretary.

The author observed that a very large number of the generic names now current are applied exclusively to insects which the proposers of the names in question never indicated as their types of the genera, to the exclusion of the real types, which were frequently placed even in other families. He presumed, and regarded it as an "axiom," that where no figure or other indication of type was given, the insect placed at the head of the genus was to be considered as the type, and that the first section of a genus was always to be considered typical. Thus Linnæus always placed the species Priamus at the head of his genus Papilio, and that species must be taken to be the type of Papilio: the consequence would be that Ornithoptera (*Boisduval*, 1836) would sink, and the present genus Papilio would receive the next oldest name, Amaryssus (*Dalman*, 1816), with Machaon for its type. Numerous other instances were given, to show the vast changes in the current nomenclature of Rhopalocera that would be required by a strict application of the law of priority to genera; the object of the author being to invite discussion, and ascertain the opinion of naturalists as to the desirability of attempting so to apply the law. He recommended that in future the type species of every genus should be indicated by some symbol, so that that species should always remain in the genus, however much the latter might afterwards be subdivided. Mr. Kirby, though he considered that an author was at liberty, when subdividing a genus of his own, to apply the name to any group of species comprised in it, provided he had not himself indicated any type, yet did not think it allowable for an author, in subdividing a genus of another author, to apply the name to any but the first section; and (if no type had been indicated by the first author) the first species of the first section must be taken as the type of the restricted genus. In conclusion, Mr. Kirby alluded to some difficulties in specific nomenclature; where the sexes of an insect had been described under different names simultaneously, he thought the rule was that the name given to the male should stand, whether that sex happened to be described a few pages before the female, or *vice versâ*.

The President doubted whether there was any such rule as that which was the whole foundation of Mr. Kirby's proposed revolution in generic nomenclature, namely, that the first species in a genus was to be deemed the type; and if any such rule were to be adopted for the future, it did not follow that it ought to be applied to the past: to give such a rule a retrospective operation would be productive of the greatest confusion and inconvenience.

Prof. Westwood had many years ago expressed the view, that where an author has by means of dissections, figures, or in any other way, indicated the particular species which he regards as typical of the genus, or which may be deemed to be the best embodiment of the idea upon which the genus is founded, *that* species is of course the type, and must be treated as such by subsequent authors; but where no such indication is given by the founder, the first species in the genus is to be taken as the type, and ought to be so taken in any subsequent dismemberment or division of the genus. But the adoption of such a rule and the application of it retrospectively would cause so much confusion that the remedy would be worse than the disease; and he should be extremely sorry to see Mr. Kirby's theory carried into practice, to the subversion of established nomenclature.

Mr. A. G. Butler discussed several of the particular instances mentioned by Mr. Kirby, and dissented from his conclusions. He argued that Papilio of Linnæus was not a genus, but included the whole of the butterflies; Linnæus's generic divisions

were his Equites, Plebeii, &c. Fabricius did describe genera, and usually indicated his type species: he was the first to describe Papilio as a genus, Priamus was not the type of the Fabrician Papilio, but the insects now known by the name Papilio did come within that genus as limited by Fabricius.

Mr. Pascoe thought that Linnæus and the older authors had no types at all: the notion of a type-species was of modern date: he saw no ground whatever for regarding the first species in a genus as the type: his notion was to discover the species which, at the time when the genus was first named, was, by reason of its size or its abundance or any other circumstance, most prominent amongst those which the author grouped together under the same name, and *that* insect he took to be the type of the genus. That the first species in the list could not be the type was conclusively shown by the fact that, in successive editions of his works, Fabricius in many instances placed different species at the head of the same genus, probably without any other guiding principle than that of putting the largest species at the head; the largest species of yesterday was deposed in favour of the later but larger discovery of to-day.

Mr. Stainton agreed with the previous speakers that the rule of priority could not be applied to genera in the manner suggested by Mr. Kirby; and he did not think that, in the absence of indication, the first species in a genus was necessarily the type. Take, for instance, the genus Tryphæna, of which almost every one would be ready to admit that Pronuba was the type; yet in almost every list the species Orbona was placed first, and Pronuba came about the middle of the genus. When the author has not indicated any particular species or section of his genus as typical, the subsequent author who subdivides the genus has the right to determine to what section of the old genus the old name shall be restricted, and his determination on that point ought to bind all future writers.

Mr. Janson agreed that the subsequent author has the right to allot the original name to any division of the original genus, but if he does so it is rather as a matter of courtesy to the original author than of right on the part of the latter to have the original name retained. Suppose the original description of Aleochara by A. is silent as to the tarsi; B. on revising the species congregated under that name finds a group of fifty species with four-jointed tarsi, and another group of fifty species with five-jointed tarsi; B. is at liberty, if out of courtesy to A. he chooses to do so, to retain the name Aleochara for either of the groups, though neither group is the Aleochara of A.; but since neither group alone is the Aleochara of A., B. is equally at liberty to give, and is logically more correct in giving, a new name to each of the groups, and so discard Aleochara altogether.

Mr. Frederick Smith (who observed that, on Mr. Kirby's principle, the honey-bee would cease to be an Apis), Mr. Edward Sheppard, Mr. J. Jenner Weir and Mr. M'Lachlan, also remarked upon the intolerable inconvenience which would ensue from any attempt to put in practice the views advanced by Mr. Kirby.

With reference to the question of specific nomenclature, Prof. Westwood certainly understood the rule to be that, where the two sexes of one insect were contemporaneously described under two names, upon the ascertainment of their specific identity, the name of the female was dropped and that of the male was retained as the name of the species.

Mr. M'Lachlan inquired what was to be done when in different parts of the same book (not being a periodical, but issuing from the press in its entirety and complete)

the same insect is described, or two forms which ultimately prove to be the same species and of the same sex are described, under two different names: both names being published at the same moment, neither can be said to have priority over the other.

Mr. Wormald thought that, under such circumstances, the less appropriate name of the two should be rejected; or if one of the described forms was the ordinary form of the insect and the other a mere variety, the name given to the ordinary form should be retained.

Mr. Dunning suggested that to this special case also were applicable all the reasons which in ordinary cases had necessitated the introduction of the artificial and conventional law of priority. The priority contemplated by that rule was doubtless priority in point of time, and not of place or position; but when there was perfect simultaneity, the ordinary rule of priority failed, and required to be supplemented by some other and additional rule of easy and absolute application. Time failing to answer the purpose, space may serve to supply a criterion. Though p. 5 and p. 50 are published together, the former is before the latter; and in the case supposed the law of priority in point of time may conveniently be supplemented by a secondary law of priority in respect of place.

Reverting to generic nomenclature, Mr. Dunning thought the result of the discussion might be summed up as follows:—(1) that the prevailing opinion was against the existence of any such rule as that supposed by Mr. Kirby—that the first species in a genus was the type; (2) that the Members present were unanimously adverse to the retrospective application of any such rule, which, if adopted at all, could not be confined to any one group, but must be of general application to every branch of Natural History; (3) that on the division of one genus into several, in the absence of indication of type by the founder, the author who divides the genus has a right to determine to which division the original name shall be restricted; and (4) that, in the view of the majority, the original name ought to be retained (as of right, and not out of mere courtesy) for some section of the original genus. To these conclusions Mr. Dunning expressed his assent.*

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* I suppose we are all agreed that where the first describer of a genus indicates which particular insect he regards as typical of the genus, that indication is binding on future describers, and so long as the name is retained as the name of a genus at all it must include the particular species so indicated.

The indication of typicality may be either express or implied. If the latter, evidence either intrinsic or extrinsic, positive or negative, is admissible to ascertain the author's intention; we may and ought to resort to any and every source or means of information to determine what species presents the most perfect embodiment of the idea which was in the mind of the founder, and possesses the most perfect development of the characters which the founder has assigned as distinctive of his genus. The publication of figures and dissections of a particular species; the predominance of an insect at the time and place when and where the author wrote, either by reason of its size, beauty, abundance, destructiveness, or any other prominent trait; or the very name given to the genus, may frequently serve as sufficient indication. Thus (to take an instance referred to by Mr. Kirby) the name Polyommatus shews that Latreille had

in his mind's eye the species which bear on their under surface the numerous eye-like spots distinctive of our "common blues," and he gives a figure of P. Corydon; yet most modern classifiers, neglecting these indications, place the polyommatous or "many-eyed" species in the genus Lycæna, and apply the name Polyommatus to species which have no eye-like spots at all. In the case of a genus which is originally established on a single species, the negative evidence afforded by the non-indication of other species as belonging to the genus, is almost tantamount to an express indication of typicality.

But (to come now to Mr. Kirby's paper), when the founder entirely omits to give any indication, is the first in his list of species necessarily to be taken as the type-species? is the first section of the genus necessarily the typical section? Mr. Kirby's proposed reform is based entirely on this proposition, which he terms an "axiom." But instead of being axiomatic, either self-evident, or an established proposition, I think it is capable of distinct disproof; and that so far as Linné, Fabricius, and the older authors are concerned, it can be shown to demonstration that in many cases, whilst they have not indicated what *was* their type, they *have* indicated that their first species, or first section, was *not*. In the first place, an insect that is once the type of a genus must ever remain the type; yet (as mentioned by Mr. Pascoe) Fabricius, in the successive editions of his works placed different species at the head of the same genus, and (if my memory serves) Linné did the same. Again, the species of which dissections, &c., are given is frequently not the first species in the genus. And (what seems to my mind decisive on the point) look at Linné's description of Cimex: "*alæ* quatuor, cruciato-complicatæ: superioribus anterius coriaceis:" the first section of Cimex is "*apteri*," and at the head of the genus is the wingless C. lectularius. The notion of a wingless insect being the type of a four-winged group is somewhat amusing! I believe other instances, not quite so startling, but in principle the same, might be adduced in abundance; but Cimex, if it stood alone, is enough to show that, so far as Linné is concerned, the notion of taking the first species, or first section, as the type, is simply the reverse of what the author intended. It may be that the Cimex of Linné (as was argued by Mr. Butler respecting Papilio) is not properly a genus at all; but whatever it be, it must I think be clear that in the contemplation of Linné himself, the first section or species of Cimex was not his type of Cimex.

In a detached paper, containing descriptions of genera taken haphazard and at random, there may be some presumption in favour of the notion that the species first described is typical of the genus; and even in a complete systematic work, there may be a slight presumption in favour of the typicality of the first species of a genus which (like Papilio) is placed (as it were) at the top of the tree. But as regards any other genus than the first in the list, it seems to me that in a systematic work or catalogue the presumption would rather be against the first species; for suppose three genera, A, B and C; the arrangement being necessarily linear, and following the affinities of the species, the first species of genus B would be that which most nearly approached genus A, just as the last species of genus B would be that which most nearly approached genus C; and it would be neither at the top, nor at the bottom, but about the middle, of genus B, that we should find the species of B which was most different from both A and C, which species would presumably be the ideal representative of genus B, would presumably have that aggregate of characters which constitute the genus B, and distinguish it from A on the one hand and from C on the other.

I hold therefore, not only that Mr. Kirby's rule is inappropriate to the past, but that it would be an unhappy rule to adopt for the future.

I conceive that the practice hitherto has been a tacit recognition of the proposition enunciated by Mr. Stainton—that when a genus (of which no type has been indicated) comes to require division, the author who performs that operation is the person with whom it lies to decide which of the dissevered parts shall retain the original name. This practice has worked pretty well in the past, and will suffice for the future. I apprehend that the evils which have arisen in the past have been caused by the fact that the separatist, failing to recognise the original author's indications of typicality, has applied the rule to cases which were not properly within its range. But assuming that the separatist has not disregarded the original author's indications, or in other words that the case was a proper one for the application of the above rule, then I hold that his determination ought to be final and conclusive on writers subsequent to him, and is entitled to the full benefit of the law of priority.

But whilst agreeing to the above proposition, Mr. Janson goes a step further; whilst leaving the second author at liberty, he frees him from any obligation, to retain for either division the name given by the first author. And I believe some naturalists go a step further still, and say that the second author ought not to retain the original name as the name of either division, but should give a new name to each division. That is to say, because we cannot call by the name of Papilio *all* the species which Linné included under that name, therefore we shall not call *any* of the species by that name. It is quite true that the Papilio of Latreille is not co-extensive with the Papilio of Linné; the Papilio of this century is only part of Papilio of the last century; to the characters, as given by Linné, admitting a very wide range of forms, Latreille has superadded other characters, possessed by some but not by all those within the Linnean range; the effect is to restrict the application of the name to a part only of the insects which Linné recognised under the term Papilio; but every species of the Papilio of Latreille *must* be a species of the Papilio of Linné, not necessarily known to Linné, but within the description given by him. Florence remains an Italian city notwithstanding that Mentone has been taken from Italy. Machaon may remain a Papilio notwithstanding that Priamus has been removed. There is no misapplication of the name Papilio—only a narrowing of its application.

Consider the consequence of the rejection of the older name, instead of the restriction of its limits. Genus A is divided into two; each receives a new name, B and C: there is no longer a genus A. A few years later B and C are subdivided, B into D and E, C into F and G: there is no longer a genus B or a genus C. A few years later the same process is applied to D, E, F and G: these in turn are discarded, and give place to H, I, J, K, L, M, N and O; and these again make way for the rest of the alphabet. There is an end to all stability or permanence of generic nomenclature. At the present rate of discovery of species and publication of genera, there would not be in use twenty years hence a single generic name which is now employed.

I care not whether it be called Papilio of Linné, or of Latreille—in fact, the genus, as now understood, is not exclusively due to either, but is the result of the work of both. To Linné we owe the name, to Latreille our present conception of the genus. But to whomsoever the credit (such as it is) may be due, I hope that so long as genera are recognised at all, so long will there be a genus Papilio.

Hitherto we have discussed the division of one genus into two or more. The converse case, of the aggregation of two or more genera into one genus, has recently been discussed (in the Ann. and Mag. Nat. Hist. 1868) by Mr. Pascoe and Messrs. Douglas and Scott. Mr. Pascoe objects to "giving new names to such genera as are formed by the union of two or more genera of a preceding writer." Messrs. Douglas and Scott reply that "it cannot be said with any truth that the name of a thing should be retained for another thing which is differently constituted, but of which the former may be an ingredient. A chemist when he combines two or more elements does not give the name of any one of them to the resulting compound; neither can it be rightly done in the labours of the naturalist." Illustrations of this sort, which are not arguments, are often delusive, never conclusive: probably those I am about to give are as much or as little so as the above illustration of my friends. But to my mind the grouping together of two things under one name may be more aptly illustrated by a geographical than by a chemical simile: the question is one of boundaries, not of constitution or composition, or chemical amalgamation. France remains France notwithstanding the acquisition of a piece of Italy; Prussia remains Prussia, though it has absorbed the whole of Hanover. The limits are changed, but the name is not; a Nizzard is now (nominally) a Frenchman, a Hanoverian is now (nominally) a Prussian; a Parisian remains a Frenchman, a Berliner remains a Prussian. If an author has established two so-called genera, A and B, and subsequent authors come to the conclusion that, whilst A is a good genus, B has not sufficient distinctive characters to entitle it to rank as a genus apart from A, surely the least inconvenient course is to take A as the name of the whole, rather than abolish A and B, and impose a new name, C. And (in this case, at all events) there is no impropriety in applying name A to the whole group; the ground on which it is done being this, that B is in fact part of A, and was erroneously severed from A; it never ought to have been made a genus, and the name therefore is properly sunk, when the supposed genus to which it was applied is found to be untenable as a genus. On the other hand, I am quite ready to admit that in other cases it may be more convenient to give a new name to the united group; England and Scotland are united into one kingdom, but it is not the kingdom of England, or the kingdom of Scotland, but the kingdom of Britain. So (without any insinuation that either England or Scotland could not stand alone) if an author has established two so-called genera, X and Y, and subsequent authors come to the conclusion that neither X nor Y can stand alone as a genus, but yet that the two combined do properly form a genus (a possible case, though scarcely a probable one), neither name has any better claim to retention than the other, neither represents a genus, and there seems nothing for it but to sink them both, and give a new name Z to the real genus, which is then in fact for the first time indicated.—*J. W. D.*

January 4, 1869.

H. W. Bates, Esq., President, in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Transactions of the Linnean Society,' Vol. xxvi., Part 2; 'Journal of the Linnean Society,' Zoology, No. 44: presented by the Society. 'Proceedings of the Royal Society,' No. 104; by the Society. 'Memoires de la Société de Physique et d'Histoire Naturelle de Genève,' Vol. xix., Part 2; by the Society. Hewitson's 'Exotic Butterflies,' Part 69; by W. W. Saunders, Esq. 'The Entomologist's Annual,' for 1869; by the Editor. Newman's 'British Moths,' No. 25; by the Author. 'The Zoologist,' for January; by the Editor. 'The Entomologist's Monthly Magazine,' for January; by the Editors.

By purchase:—Gemminger and Von Harold, 'Catalogus Coleopterorum,' Vol. ii.

Election of Members.

W. F. Kirby, Esq., Assistant in the Museum of the Royal Dublin Society (previously an Annual Subscriber), and E. Holdsworth, Esq., of Shanghai, were elected Members.

Exhibitions, &c.

Mr. Bond exhibited two diminutive specimens of Vanessa Urticæ, about half the usual size of the butterfly; they were two out of fifty or more dwarfs, not all of the same brood of larvæ, which, owing probably to the extreme heat of 1868, had been developed with remarkable rapidity, having remained less than a week in the chrysalis state.

Mr. Bond also exhibited a dark variety of the female Apatura Iris, and a very pale variety of Hesperia Comma.

Mr. E. G. Meek exhibited specimens of Dianthœcia Barrettii, captured by Mr. Gregson, in Ireland.

Mr. W. C. Boyd exhibited a specimen of Crambus myellus, captured by Mr. Adam Boyd some time since near Blair Athol, and which had remained mixed in Mr. Boyd's collection with C. pinetellus, until his attention was called to it by the announcement at the previous Meeting (*ante*, p. xlii.).

The Secretary exhibited photographs of nests of Vespa Britannica and V. arborea, presented to the Society by Mr. John Hogg, by whom the nests were found at Norton, Durham.

Mr. F. Smith exhibited a series of drawings of bees and wasps and their respective nests, and a number of the actual nests, collected in India by Mr. Charles Horne.

Mr. Horne (who was present as a visitor) gave some interesting details on the habits of the insects. The species of bee which was kept by the natives was, he believed, the Apis dorsata. In the North-west Provinces, it was necessary to leave the key in every lock, or the cavity was pretty sure to be occupied by a Pelopæus: if a sheet of paper was left on a mantel-shelf, it would be fixed thereto by an inserted mud-cell; or a like cell might often be found interposed between a pillow and the bed; even a little hollow in the floor, in spite of the inevitable destruction of the nest, would be filled;

and in one case he had known a nest to be placed on the edge of a door, and it was seven times crushed by the shutting of the door, and seven times renewed before the little bee could be induced to forsake the spot she had chosen. Some of the nests exhibited were placed in very singular positions; one, of a leaf-cutting bee, was in the handle or ear of a terra cotta vase, access being obtained through a small hole in the narrow lower end of the handle; another, belonging to a Pelopæus, and consisting of a single mud-cell, was attached to a man's signet or finger-ring the stone of which had fallen out, and was fastened to the metal by means of a coil or knot of mud passed through the hole where the stone had been; a third nest of a bee consisted of a spherical mass of cells which was found in the centre (filling up the whole hollow) of the nest of a mouse, which was suspended in grass.

Prof. Westwood mentioned that at Oxford he had found a mouse's nest in the centre of one of his bee-hives, surrounded by a number of headless bees.

Mr. Horne also exhibited a strong earthern cocoon, dug out of the ground, and containing a large species of Sternocera; he had frequently found the perfect beetle thus encased, and it was the regular habit of this species of Buprestidæ. (Compare the habit of Lucanus cervus, *ante*, p. ix.)

Prof. Westwood exhibited drawings and gave some account of various remarkable insects, including (1) a species of Leptocorisa (Cimicidæ, Coreidæ) sent by Mr. Thwaites, from Ceylon, where it was very injurious to the rice crop, sucking the juices of the plant—it was probably identical with the local variety of Cimex varicornis which he (Prof. Westwood) had described under the name Bengalensis; (2) an Ichneumon and an Epeira, the larva of the former being an external parasite on the body of the spider; other instances of external parasitic larvæ were, Eulophus (Chalcididæ) on a willow-gall saw-fly, and larvæ of a Scolia on larvæ of the Lamellicorn beetle, Oryctes; (3) a new species of Coleoptera from the Niger, referable to the genus Aprostoma of Guérin, with which it was suggested that both Mecedanum of Erichson and Gempylodes of Pascoe might probably be united; (4) a beautiful species of Lamiidæ, from the Zambesi; (5) a second species of the genus Ectrephes of Pascoe (Proc. Ent. Soc. 1866, p. xvi); and (6) a new genus in Count Mniszech's collection, allied to Rhyssodes, and intended to be described as Rhyssodina.

Mr. A. E. Eaton communicated the following note:—

"Dr. A. S. Packard, jun., has very kindly sent me a *separate* of a paper by him, On the structure of the Ovipositor and Homologous parts in the Male Insect, from the Proc. Boston Soc. Nat. Hist. vol. xi. (Feb. 26, 1868), in which he has corrected his earlier observations. The result of his later investigations is to confirm M. Lacaze-Duthier's statement that 'les tarières des Névroptères sont semblables aux tarières des Hyménoptères,' which his earlier conclusions had (as I showed in Trans. Ent. Soc. 1868, p. 143) contradicted; and the paper also shows in what way the French author came to be mistaken in supposing that the sting grew out from the ninth segment alone."

Mr. Frederick Smith read the following:—

On the Affinities of the Genus Sibyllina, of Westwood.

"At the Meeting of this Society on the 16th of November, Professor Westwood described, under the name Sibyllina ænigmatica, an insect that has for some years

been standing nameless in various collections. I had, myself, after a somewhat cursory examination, referred it to the ants, and had placed it in the family Poneridæ. A few years ago I had an opportunity of submitting this insect to Dr. Nylander, who thought I was right in so doing, but I must admit he had only time to give it a very slight examination. Prof. Westwood (Tr. Ent. Soc. 1868, p. 329, Proc. p. xli.) has referred it to the Vespidæ, its position being indicated as near the genus Belonogaster, of Saussure.

"At the time when the paper was read, I expressed an opinion that it could not belong to the Vespidæ: I have therefore felt bound to examine the insect with a greater degree of attention, and have carefully and minutely investigated its structural peculiarities: the result has been, that I have changed my opinion as to the family to which it belongs, although I shall still be found to differ widely in that respect from Prof. Westwood, and also from Mr. Haliday, who once examined the insect, and determined that it belonged to the Sphegidæ, being in his opinion closely allied to the genus Pelopæus.

"Having expressed an opinion that it does not belong to the Vespidæ, it is incumbent upon me to give my reasons. In the first place, all true wasps, the social as well as the solitary species, have the anterior wings folded longitudinally, except when they are used in flight; in the genus Sibyllina they are not folded. In the next place, every true wasp has four submarginal cells, the fourth being very frequently incomplete, but in some species of the genera Belonogaster, Polistes, and also of the genus Vespa, among the social wasps, and in the solitary group, in the genera Zuthus, Rhynchium, Abispa and Synagris, the fourth cell is complete; but I know no species of wasp that has not three complete submarginal cells; the genus Sibyllina has only two. Then, every true wasp has three discoidal cells in the anterior wings; Sibyllina has only one. The prothorax in all the Vespidæ forms the upper anterior portion, and is prolonged backwards to the tegulæ of the wings; the prolongations also forming lateral portions of the upper surface: this is not the case in the genus Sibyllina. The only character which Sibyllina possesses in common with the Vespidæ is that of having lunate, or notched, eyes: this I regard as only a subsidiary character, being common to a vast number of Hymenopterous insects. We find the lunate eye in many species of the genera Mutilla, Scolia, Sapyga, Pemphredon and Philanthus: then again, among the Ichneumonidæ, it is found in species belonging to the genera Pimpla, Camploplex, Anomalon, Ophion and some others; this character therefore cannot be regarded as any strong evidence in favour of Sibyllina being a genus of Vespidæ. It is a fundamental charactar, distinguishing the social wasps, that the claws of the tarsi are all simple—in Sibyllina the claws of the posterior tarsi are toothed;—the solitary wasps are distinguished by having the claws of the tarsi dentate.

"After a very careful examination of the insect, I have come to the conclusion that Sibyllina belongs to the Ichneumonidæ.

"The first, and the strongest objection that can be urged against this opinion, will doubtless be that the antennæ are only twelve-jointed, and not, as in the generality of the Ichneumonidæ, multiarticulate: this is undoubtedly true, but there are genera of Ichneumonidæ having only twelve- and thirteen-jointed antennæ. Among the minute Ichneumons the genus Trioxys is found to have thirteen-jointed antennæ; and in Ephidrus, belonging to the same group, they are only twelve-jointed. In the next place, I believe every species of the larger group of Ichneumons, (I am not prepared to speak

of the minute ones in that particular) has double-jointed trochanters: these joints in most of the genera and species are distinctly visible, but not universally so in the group; in some species belonging to the genus Exetastes, the second joint is retracted within the first, and is only partly visible; the same is the case in the genus Anomalon. I have carefully examined the structure of the legs of Sibyllina, and I find a second joint distinctly visible, quite as much so as in the Ichneumonidous genus Metopius. The antennæ of every wasp that I have seen are geniculate, in Sibyllina they are not. In addition to this, the prothorax is of the same structure as in Ophion and Anomalon; its ocelli are large and prominent, as in those genera, whilst in the Vespidæ they are much smaller, and usually more sunken than prominent. Another most remarkable peculiarity in the structure of Sibyllina, is the broadly-dilated tarsal joints, a character I believe nowhere to be found in the Vespidæ, but peculiarly characteristic of the species of the genus Anomalon. The abdomen of Sibyllina has the basal segment narrowed into a slender petiole; this is also characteristic of the genus Ophion and Anomalon. Then again, Sibyllina is furnished with a sting, or ovipositor; its structure is precisely the same as the sting or ovipositor of Ophion and Anomalon: in fact I can discover no external difference between the stings of Belonogaster, Vespa, Ophion and Anomalon; in each the sting tapers to a sharp point, and is simply a hollow tube, having a groove beneath, that in the wasp being, I presume, for the purpose of conveying poison into the wound made by piercing, and in the case of the Ichneumons for conveying the egg into the victim attacked.

"Place Sibyllina in any group of the Hymenoptera, and it will, as it were, stand alone; it has little affinity that I can discover, certainly it has no strong affinity, with any other known insect. But having pointed out those parts of its structure that agree with the same parts in the genera Ophion and Anomalon, I shall conclude by expressing my opinion that the genus Sibyllina should be referred to the Ichneumonidæ, and that its closest ally is the genus Anomalon."

Prof. Westwood thanked Mr. Smith for his careful investigation of the affinities of Sibyllina, and congratulated him upon having arrived at a conclusion identical with that of the American entomologist, Mr. Cresson, who had referred to the Ichneumons an insect which he (Prof. Westwood) believed to be the same as Sibyllina. At the same time he was scarcely prepared to admit that the insect is an Ichneumon. The two-jointed trochanters, upon which Mr. Smith placed considerable reliance, were by no means peculiar to the Ichneumons, and if the character existed in Sibyllina, it rather pointed in another direction; he (Prof. Westwood) however could not detect the second joint, though he had looked carefully for it. Mr. Smith had not noticed the diversity in the number of joints in the antennæ of the sexes, twelve in the male, thirteen in the female, which was very characteristic of the Aculeata.

The President suggested that Sibyllina might be the type of a group connecting the Vespidæ and Ichneumonidæ.

Papers read.

The following papers were read:—"On the Affinities of the Genus Sibyllina of Westwood," by Mr. F. Smith. (See above).

"Descriptions of Nine New Species of Buprestidæ," by Mr. Edward Saunders. Belonging to the genera Sternocera, Julodis, Catoxantha, Chrysaspis (n. g.), Psiloptera, Pseudhyperantha (n. g.), Hyperantha, and Acherusia (two).

ANNUAL MEETING,

January 25, 1869.

Frederick Smith, Esq., Member of the Council, in the chair.

An Abstract of the Treasurer's Accounts for 1868 was read by Mr. S. J. Wilkinson, one of the Auditors, and showed a balance in favour of the Society of £79 10*s.* 0*d.*

The Secretary read the following:—

Report of the Council for 1868.

In accordance with the Bye-Laws, the Council begs to present the following Report.

The number of our Members has again suffered a slight decrease; the ten elections during the year are scarcely sufficient to supply the places left vacant by those whose names, by death, resignation or default, have been removed from our List. We have lost Boheman, the youngest of our Honorary Members; and by the death of Desvignes the small remnant of our Original Members has been made still smaller.

The additions to the Library have been numerous; both by donation and by purchase our shelves have received very valuable acquisitions.

But, like its immediate predecessor, it is for the extent of the Society's publications that the year 1868 is conspicuous. The production of upwards of 650 octavo pages of letter-press, illustrated by twenty-four plates, of which nine are coloured, is sufficient to prove alike the activity of our Members and the economical administration of our finances. Besides the 'Transactions for 1868,' the first of the new issue announced in the last Report of the Council, and we trust the precursor of a long line of annual volumes of not less extent and of equal scientific value, the Society has published other papers which must be regarded as in the nature of a bonus. Of the "Third Series" of the Transactions, volume 3 has been advanced a stage, volumes 4 and 5 have been completed and indexed. And the contents of these have been attended with somewhat unusual expense; witness the coloured plates of Malayan Longicornia and Cetoniidæ, and the printing of Mr. Jenner Fust's Tables of Distribution of British Lepidoptera. The last work, indeed, would have been beyond the means at the disposal of the Council, had not the author himself come liberally to our aid, and had not his assistance been supplemented by a vote of the Government Grant Committee of the Royal Society. A further instalment of the 'Longicornia Malayana' is on the table this evening, and it is hoped that the ensuing autumn will witness the completion of Mr. Pascoe's Monograph, and with it the completion of the "Third Series."

Two pleasing circumstances in connection with the Transactions deserve to be mentioned here; first, the considerably increased sum derived from sales, as compared with the preceding twelve months; and secondly, the growing number of new contributors whose maiden papers have during the last two or three years been printed under the auspices of the Society.

The sources of income and heads of expenditure may be briefly exhibited as follows:—

Receipts.	£	Payments.	£
Contributions of Members . .	210	Publications	325
Sale of Publications . . .	99	Library	37
Interest on Consols . . .	3	Rent and Office Expenses . .	66
Donations	133	Tea at Meetings . . .	14
	£445		£442

The expenditure exceeds that of any other of the thirty-five years during which the Society has existed. The £210 from Members includes the composition of a Life Member in lieu of annual payments; the outlay of which in the permanent improvement of the Library the Council regards as a proper application of a fund which is capital rather than income. The item of £99 from the sale of Transactions has already been referred to, as a cause for gratification; but the amount ought to be still further increased: will it be believed, that of all our Metropolitan Members, not a dozen care to purchase (at half-price) a copy of our works? The item for Rent and Office expenses, £66, has been reduced to a minimum; no further reduction in the cost of administration is possible. The £325 paid for printing and plates is exclusive of the cost of drawing and engraving four plates of Longicorns, for which, as on many previous occasions, we have to offer our thanks to Mr. Wilson Saunders. It is from extraordinary donations (among which the Council begs especially to call attention to that of £70 from Mr. Dunning), and not from the regular income of the Society, that a large portion of the expenditure on the Transactions has been defrayed—a state of affairs which the Council does not affect to consider satisfactory, and which is defensible only on the ground that, in the interest of Science, the curtailment of our publications would be still more unsatisfactory. Adding the small balance brought forward from 1867 to the slight excess of receipts over payments for 1868, the Treasurer starts the year 1869 with cash in hand to the amount of £5 12*s.* 0*d.*

The "List of the Insects of the British Isles" has not been forgotten; considerable progress has been made, particularly with the Hymenoptera and Neuroptera; the Perlidæ now form the only obstacle to the completion of the latter Order, and as Mr. M'Lachlan is actively engaged in revising that Family, it is hoped that the Catalogue of Neuroptera will be ready before many months have elapsed.

It is a source of regret that many of our Entomologists should be so far wanting in public spirit as to withhold their support from the body which is the representative of the United Kingdom in the Parliament of the Entomological World: it is a source of wonderment that so many of them who, if devoid of abstract love of the science, might be supposed to be influenced by utilitarian arguments, should be backward in joining a Society whose Members receive so full a return for their subscription. The Annual Contribution is but a guinea. To the Metropolitan Members, the Library and Meetings—to the Provincial Members, the Transactions—afford a really remunerative *quid pro quo*. For the last seven years, with an average of 150 contributors, the average expenditure of the Society has exceeded 350 guineas. The Council, in conclusion, desires to urge upon Members the desirability—not to say the

necessity—of obtaining an addition of (say) fifty to our numbers. It is by individual exertions, rather than by collective action, that such a result is likely to be attained.

January 25, 1869.

The following gentlemen were elected Members of the Council for 1869:—Messrs. H. W. Bates, Hon. Thomas De Grey, Dunning, Grut, M'Lachlan, Pascoe, Salvin, G. S. Saunders, F. Smith, Stainton, S. Stevens, A. R. Wallace and Wormald.

The following Officers for 1869 were afterwards elected:—President, Mr. H. W. Bates; Treasurer, Mr. S. Stevens; Secretaries, Messrs. Dunning and M'Lachlan; Librarian, Mr. E. W. Janson.

The following Address (in the absence of the President, whose official duties compelled his attendance elsewhere) was read by the Secretary:—

THE PRESIDENT'S ADDRESS.

GENTLEMEN,

According to the custom observed by us in common with other scientific societies, which requires that the person occupying the honourable position of President shall give, at the Anniversary Meeting, some account of the progress made during the year in the especial branch of Science cultivated by the body over whom he presides, I will now endeavour to fulfil this portion of my duties by submitting to you a sketch of some of the more interesting subjects connected with Entomology that have called for attention during the past year.

Commencing with our own Society, it is my duty first to mention the Members lost to us by death, since our last Anniversary.

We have to regret the loss to ourselves and Science of Professor C. A. Boheman, of Stockholm, one of our Honorary Members, who died on the 2nd of November last, at the age of seventy-two. The principal works of this learned Entomologist were published in his riper years. They relate exclusively to the systematic department of our study, and are distinguished for the unvarying amplitude, uniformity and conscientiousness of the specific descriptions, written in Latin. His 'Insecta Caffrariæ,' a description of the Coleopterous insects collected by the indefatigable naturalist and elephant hunter Wahlberg, during a long series of years, was commenced in 1848,

a second part appearing in 1851 and a third in 1857, the work remaining unfinished at his death. The work which perhaps will remain his chief title to fame was his 'Monographia Cassididarum,' or Monograph of the Coleopterous family Cassididæ, published in three volumes in 1850, to which he added, some years afterwards, a supplementary volume, the whole forming one of the most complete and masterly monographical works that have hitherto been produced on this inexhaustible Order. On his visit to London, in 1853, his unassuming bearing and great special knowledge acquired for him the esteem of many of our best Entomologists, and he was engaged by Dr. Gray, Keeper of the Zoological Department of the British Museum, to compile a Catalogue of the Cassididæ, with especial reference to the collection of this particular group in the national establishment. This work, forming one of the well-known duodecimo Catalogues, was published in 1856. Since then he appears not to have undertaken any work of magnitude, if we except the Coleopterous portion of the 'Eugenie's Resa,' but he regularly took part in the proceedings at the Meetings of the Swedish Academy of Sciences, and communicated several short papers, one of which, on the Coleoptera of South-West Africa, of some interest to the general Coleopterist, was published in the 'Proceedings' of the Academy for 1861.

Mr. Thomas Desvignes, one of what may be termed the old school of British Entomologists, was chiefly known for his great knowledge of the British Ichneumonidæ, on which he published several treatises, besides a catalogue of the species, forming part of the series issued by the Authorities of the British Museum. He was one of the original Members of our Society, but of late years was seen but rarely amongst us. He died at Woodford on the 11th of May last.

Abraham Cooper, Royal Academician, was also one of the few remaining British Entomologists of the old school, records of whose rare captures appear frequently in the earlier works of Stephens and Curtis. He was probably the oldest of our Entomologists, being in his eighty-second year at his death, which happened last Christmas Eve. Forty years ago he was an ardent collector, and rendered, at that time, good service in assisting the leading Entomologists of the day, by his discoveries of new and rare species. Dendrophilus Cooperi (since ascertained to be D. punctatus of Herbst) was named after him, and he was the first to discover in this country Stilicus fragilis and other remarkable insects.

Thirty years ago the name of William Edward Shuckard was a

household word with every British Entomologist. The translator of Burmeister's 'Handbook,' the author of the 'Essay on the Fossorial Hymenoptera' and the 'Monograph of the Dorylidæ,' of the letter-press of 'The British Coleoptera Delineated,' and of numerous other papers, several of which appeared in the early volumes of our 'Transactions,' was formerly an active Member of our Society: after a silence of nearly a quarter of a century, Mr. Shuckard published his 'British Bees' in 1866, and died at Kennington on the 10th of November, 1868, at the age of sixty-five.

And, though not one of our body, nor in any way a man of Science, a passing word may be permitted me to record the death of Charles Turner, well known, at least to our metropolitan Coleopterists, as a most persevering collector, to whom our cabinets owe many rarities, and more than one novelty.

I believe I may safely congratulate you on the share which the Entomological Society of London has had in promoting the study of our difficult branch of Natural History, during the year that has recently closed. We have held, as heretofore, twelve Meetings, uniformly well attended, at which valuable papers have been read, and many topics, relating to variation, economy and nomenclature, have been discussed, I hope with the effect not only of ventilating the subjects, but of eliciting opinions and facts from men of experience, which may be of some interest to the cultivators of other departments of science. Our published 'Proceedings,' in which these discussions are reported, are given with more completeness than is usually the case with learned societies, for which we are indebted to the industry and excellent judgment of our senior Secretary, Mr. Dunning. With regard to our 'Transactions,' in which are published the more important memoirs read before us, I must call your attention to the improvement made in the past year in the mode of publication, an improvement the suggestion and carrying out of which we also owe to our senior Secretary. Instead of issuing an indefinite number of parts, forming a volume every two or three years, we now publish a volume each year, a simplification which will earn for us the blessings of all working Entomologists, who have to quote our volumes or the dates of the publication of species recorded in them. The four parts composing the volume for 1868 (the Index and completion of the 'Proceedings' await only the conclusion of this day's Meeting) were issued within the year. They contain 332 pages of 'Transactions' proper,

besides 'Proceedings' separately paged, and are illustrated by fifteen plates.*

The number of memoirs published is eighteen, nine of which are purely descriptive, three consist of rectifications of synonymy, &c., and six are on insect economy, anatomy and morphology. Nearly all Orders of insects are treated of in the volume; and if there be any deficiency it can only lie in the scarcity of papers on the Entomology of our own islands. And here let me remind Members who may be disposed to make this objection to the contents of our publications, that the absence of such papers is not the fault of the Council, who can only select papers, for printing, from such as are submitted to them, and would be pleased to receive interesting memoirs relating to the geographical distribution, economy, structure and physiology of even our commoner British insects. I am glad to be able to add that the sale of our 'Transactions' has been greater in 1868 than during any recent year.

Looking beyond our Society, there are no special signs that the study of Entomology has made much progress in the British islands. I might, however, point to memoirs of some importance which have been read before our parent Society, the Linnean, and are published in their 'Transactions' and 'Journal;' and also to the descriptive papers by Mr. Andrew Murray, Mr. Pascoe and Mr. Butler, contributed to the 'Annals and Magazine of Natural History.' The two periodicals devoted to Entomology, the 'Entomologist's Monthly Magazine' and the 'Entomologist,' have appeared regularly during the year. These journals fulfil well their purpose of serving as a record of occurrences and observations relating to British insects, and keep alive the interest of the numerous collectors, many of whom are also acute and original observers, who live, isolated from each other, in various parts of the country. But, besides notices of British insects, the 'Entomologist's Monthly Magazine' contains descriptive articles and short monographs of great scientific interest, and the numerous notes on the habits and transformations of species, especially those by Dr. T. A. Chapman on xylophagous insects, the Rev. J. Hellins and Mr. W. Buckler on Lepidoptera, and others, are important contributions to our knowledge of the development and economy of our native species. In the provinces,

* The volume "for 1868" is only part of the Society's publications during that year. See the Report of the Council.

the continuation of the original and highly curious observations of Mr. Watson on the plumules of diurnal Lepidoptera have been published in the Memoirs of the Literary and Philosophical Society of Manchester. One of the greatest advantages of the study which we cultivate, and which it shares with kindred pursuits, is that it supplies an incentive to healthful country rambles, and rational occupation for the mind in investigating the exhaustless marvels that Nature is ready to unfold at the bid of the patient inquirer. It is thus an antidote to the frivolity and passion for injurious excitement, which are said by satirists to distinguish our age, and to be growing amongst us. On this account one would wish to hear more concerning the establishment and growth of Natural History Field Clubs, and especially of the cultivation of Entomology by their members. To those whose occupations leave but little time for recreation, such pursuits have to offer a pleasant and healthful excitement, and a store of happy memories for after years; whilst the ambitious and energetic, by entering more deeply into their mysteries, may find worthy employment for all their powers.

An annual work which has appeared for the last four years in this country, and on which we, in common with the cultivators of other branches of Zoology, have reason to congratulate ourselves,—I mean the 'Record of Zoological Literature,'—has this year been published in separate parts, containing the main divisions of the Science. All who are engaged in the study of Zoology may obtain, therefore, and ought to have already in their hands, the record of everything that has been published throughout the world, during the year 1867, relating to the department they severally cultivate. The Entomological section, compiled by Mr. W. S. Dallas, as in previous years, occupies the lion's share of this most valuable Record, comprising no less than 484 pages. When we consider the countless number of volumes of separate works, of the 'Transactions' of learned Societies, and of periodicals, that have to be waded through in order to extract the necessary references to classification, descriptions of new genera and species, rectifications, notices of anatomy, physiology and economy, which constitute the 'Record,' we must greatly admire the industry of the authors and editor of this work, who succeed in publishing, during the summer of 1868, an account of what is contained in the vast variety of works, of all languages, down to the end of the year 1867. The only other work of a similar nature, the 'Bericht über die wissenschaftlichen Leistungen im Gebiete der Zoologie,' published

annually in Wiegmann's 'Archiv,' at Berlin, has at present reached only the first half of the record of the combined years 1865—6.

Abroad, the most noteworthy circumstance connected with the progress of our favourite Science, setting aside the appearance of several important works to which I will presently refer, is the extension of the study in new countries, or at least the establishment of societies and the publication of serial works in countries where these were previously unknown. During the past year an Entomological Society has been formed in Italy, the founders of which announce the intended publication of 'Transactions;' a few years before, in Russia, a similar Society was established in St. Petersburg, which has already issued several Parts of its Proceedings, under the title of 'Horæ Societatis Entomologicæ Rossicæ.' Some years previously an Entomological Society was started in Belgium, which continues to publish its very valuable 'Annales.' There is a similar Society in Holland; and, in short, the time is probably not far distant when Entomology will have its specially-organized body of cultivators in every European state. Already Entomological memoirs are published in the Russian language: should the practice of recording valuable information in the vernacular of each country become general, the study in its completeness of any special subject in our Science, already difficult, will become almost impossible.

In America the extension of our Science has become almost as general as in Europe. The Entomological Society of Philadelphia, after six or seven years' existence, has grown into the "American Entomological Society," and publishes many memoirs of importance in its 'Transactions.' In the United States, where the heat of the summer fosters an abundant insect life, and the very rapid and recent clearing of forests and prairie has rudely disturbed the equilibrium of life, maintained when a region is left in its natural condition, the subject of insects affects the interests and feelings of the human inhabitants to a degree not felt in the old-settled countries of Europe. Even at this distance we hear occasionally of the total destruction of the harvests of one or other part of the Western States by the "locust;" and it appears that the productions of orchards, gardens and fields in this region are all subject to similar wholesale destruction. Hence the knowledge gained by scientific students of Insects and their habits is becoming appreciated by their fellow citizens, and Entomology is rising into a profession. We hear of Dr. Asa Fitch as "State

Entomologist of New York," and of Mr. B. D. Walsh and Mr. C. V. Riley as occupying similar official posts in the States of Illinois and Missouri. A Journal devoted more particularly to economic Entomology, and entitled 'The American Entomologist,' is published in St. Louis, Missouri, and is most ably conducted. The accounts of the habits of insects, injurious or helpful to the farmer and gardener, are illustrated by well-executed wood-cuts, and the Editors announce their intention of including, in their future numbers, articles on general Entomology, and descriptions of new genera and species of American insects. In California there are now resident Entomologists, who publish their new discoveries in the 'Proceedings of the Californian Academy of Natural Sciences.' There is also an Entomological Society, which publishes its Journal, in Canada.

In several of the British colonies, in other parts of the world, there is also much greater attention paid to the study of insects than formerly. One of the most useful books on Diurnal Lepidoptera that has appeared within the last few years, the 'Rhopalocera Africæ Australis,' was published at the Cape of Good Hope. But it is in Australia that the most marked strides in this direction have been made. The recently-established Entomological Society of New South Wales numbers several men of talent and active workers amongst its members, and has published five parts of its 'Transactions,' containing papers which all general Entomologists are obliged to consult. In Melbourne, memoirs of great interest on the native Insect Fauna have been published in the 'Transactions of the Royal Society of Victoria;' I allude more particularly to the descriptions of Cicindelidæ and Carabidæ of Australia by M. de Castelnau, by which the treasures of the collection of Dr. Howitt, as well as those of the author, are for the first time made known. The impression that a glance at these memoirs produces is, that we have had hitherto but a faint idea of the extent of the Coleopterous Fauna of Australia and New Zealand, so vast is the number of new genera and species acquired in a comparatively short time by the two gentlemen abovenamed. Speculations as to the geographical relations and nature of this Fauna are vain, whilst the discovery of new forms, and of genera not expected to occur in Australia, proceeds at so rapid a rate.

Returning, in our brief survey, to Europe, it is my duty to call attention to a few of the more important works on Entomology which have appeared during the year. I will first mention those which

relate more especially to the systematic department of our Science, and afterwards notice one or two treatises which bear upon a subject interesting not only to all naturalists but to all thinking men, namely, the evidence afforded by Entomology on the question of the origin of species: this will lead me to offer a few remarks on the study of the geographical distribution of insects, with which, with your permission, I will conclude.

The work of a special nature which will have interested probably the largest number of Entomologists is the 'Catalogus Coleopterorum,' by Dr. Gemminger and the Baron Edgar von Harold. Of this colossal undertaking two Parts have appeared during the year, containing together 752 pages, exclusive of Index: at this rate it will take ten or twelve goodly-sized volumes to complete what is simply a catalogue of all described beetles, with their synonymy and localities, and references to descriptions. None but those who have attempted to compile a catalogue of a group of Coleoptera for their own use—and such a catalogue is an indispensable preliminary to studying the group and publishing new species—can conceive the difficulties which the authors of this work must have had to contend with in compiling a Catalogue of the Order for the whole world. Accuracy of synonymy throughout, and completeness of classification, whether of genera or of species, were out of the question. The difficulty with regard to classifying the species of a genus in their natural order — a difficulty which arises from each of perhaps a dozen authors registering his species according to a different arrangement, or no arrangement at all—has been got over by the authors by entering the species alphabetically. With regard to synonymy, the general rule adopted by them appears to be that of registering every genus and species, on the authority of its describer, excepting in cases where any have been proved, by recent writers, to hav been previously described; and so well has the recent literature been worked up and the authors' judgment exercised, that the number of these duplicate entries of genera and species appears to be very limited. Few experienced Entomologists believed in the possibility of such a Catalogue as the present being successfully carried out, and the quick succession of the volumes (the third I am told is now passing through the press) is an agreeable surprise to them. The value of such a compilation resides not only in its facilitating the naming of collections, but in its furnishing the means of working out the statistics of that vast host of organic beings which we term

Coleoptera, — a task that has to be accomplished in discussing subjects connected with the relations of Faunas, and with general views of the vital phenomena of the globe. The compilers have lightened the task of the future worker in this department by giving the total numbers of the species at the foot of each genus and family: we are thus enabled to learn without trouble that the number of described Carabidæ is now 8516, of Staphylinidæ 4130, and so forth. Now that Coleopterists see the possibility of a general catalogue,—a luxury of which they have been deprived since Dejean's last and very imperfect list became obsolete, many years ago, — it is to be hoped that they will all do their best to aid the authors, by contributing the synonymical notes they may have been enabled to make, in their several departments of study. By such extensive co-operation alone can the defects noticeable in this most meritorious work be in future avoided.

Another work of high rank, published in 1868, is the eighth volume of the renowned 'Genera des Coléoptères,' by Professor Lacordaire, containing the first half of the Longicorns. The reputation which the 'Genera' has justly acquired among Entomologists is due, perhaps chiefly, to the marvellous simplicity and clearness of the author's treatment of his most intricate subject. A perfect "Systema Coleopterorum" could hardly have been expected from one man, in the present state of our knowledge of this order of insects, the number of described species having increased so rapidly that it bids fair to equal that of the whole vegetable kingdom, and the old systems of classification having collapsed without giving place to anything founded on a surer basis. Professor Lacordaire has, however, succeeded in the great task he has imposed upon himself, and which he has carried on for the past fifteen years. His perspicuous method of arranging and characterizing the various groups, and the clearness with which he expresses his meaning, enable the worker to find his way to a knowledge of the genera with certainty, and, at the same time, with pleasure.

The difficulties which Professor Lacordaire has had to encounter in the course of his work have naturally increased as time rolled on, the number of new genera and new partial classifications rapidly accumulating from year to year, and rendering his study of the concluding families so much more arduous than those occupying his earlier volumes. If we may judge by expressions contained in the present volume, these difficulties have reached a climax in the

arrangement of the Longicorns. He does not however state that any part of his perplexities arise from the premature activity of authors, who have been busy in this group during the last few years, but attributes them to the obstacles to classification presented by the species and genera themselves. We have been accustomed to hear, in various quarters, dissatisfaction expressed at the inordinate multiplication of genera of Longicorns proposed by recent authors; the complainers will not find much comfort in the recently-published volume of the 'Genera.' It is true many genera, founded on local faunas, have been suppressed by Professor Lacordaire, in the Lepturidæ and one or two other groups, but he has himself, throughout the volume, created many others. He frequently mentions this subject, and in one place states that the number will still have to be largely increased. He adopts in the sub-family Prionidæ 129 genera, although the species are not much more than 300; and in the sub-family Cerambycidæ he admits 500 genera to 4500 species.

The true reason of the recent great multiplication of genera in this family of insects lies not so much in the fact that authors have delighted to exercise their talent in the facile manufacture of genera and generic names, but in a peculiarity in the mode of variation of the species, which renders natural the formation of endless small genera: the same peculiarity has given rise to the difficulty, or rather the impossibility (for so Lacordaire expresses it), of combining the genera into higher groups, capable of being distinguished by constant characters from other groups; it is also, I am inclined to believe, the originating cause of the existence of numerous anomalous forms of Longicorns, which seem to depart from the type of the family, and raise the difficulties of the classifier to the highest pitch. This peculiarity consists in the tendency, in the species of Longicorns, to vary in what are held, in other families of Coleoptera, to be important points of structure, on which genera and sub-families may be safely founded. We have proof of this kind of variability in the differences among individuals of one and the same species, cases being known of variation in the number of joints of the antennæ, in the spinous processes of the elytra and femora, and so forth. Passing from varieties of the same species, to closely-allied species, the same phenomenon appears in augmented proportions—antennæ, legs, tarsi, even the component parts of the dermo-skeleton, the sternal segments, are seen to differ in the most extraordinary way; and so on to the next step of affinity, in which, however, it often happens that all definite

trace of structural relationship (except that which makes them members of the same family) is entirely lost. This extreme variability is not of common occurrence in the class Insecta, or even in the Animal Kingdom, at least to the extent of prevailing over an entire family containing 8000 species. It may well lead us to reflect on the principle which has attended the process of origination of forms, and has led to the retention, unaltered, of portions of their structure, whilst the rest have become modified, thus enabling naturalists, in the majority of cases, to classify them. This principle is the great ally of the systematist, although he troubles himself so little with inquiry into its nature. It is this which has retained the internal bony skeleton in the class Vertebrata, whilst all the rest of the structure is changed in one or other of the component families—organs of respiration and locomotion, limbs, skin, as well as clothing and habits. If we except the two or three primary divisions of the Longicorns, there is no portion of structure which retains a given form throughout a number of species, sufficient to form a well-defined genus of ordinary length or a group of genera. As M. Lacordaire expresses it, "Les caractères les plus importants s'altèrent, s'effacent et disparaissent, avec une rapidité désespérante." It surely is not too much to say that if such instability were a general feature of the Animal and Vegetable Kingdoms, classification would have been impossible, and Linnæus himself would have striven in vain; yet its existence throughout the extensive secondary groups of the Longicorn Coleoptera shows, that stability of some structural characters and modification of others—in other words, the formation of natural genera—is not an invariable accompaniment of the process of creation, and I think the subject has not yet received all the attention it deserves or will eventually receive.

One of the works to which I alluded as bearing on the question of the origin of species is a treatise entitled "Entomologische Beiträge zur Beurtheilung der Darwin'schen Lehre von der Enstehung der Arten," published early in the past year, in the concluding part of the 'Berliner Entomologische Zeitschrift' for 1867, at page 327. The writer, Herr von Kiesenwetter, is an author of wide reputation, and belongs to what I think may be fittingly called the Berlin school of Entomologists—a class who have distinguished themselves more especially as rigid systematists, being known for their acute and profound investigations into the characters of varieties, species, genera, and higher groups, in their application to classification. Some of the

best monographs of our day, such as those of Erichson and Gerstäcker, have been the work of members of this school, and three of them, Schaum, Kraatz and von Kiesenwetter, are the authors of volumes of the well-known faunistic work, the 'Insecten Deutschlands,' in which the Coleopterous fauna of Germany is treated, not as faunas usually are, as a collection of species independent of the rest of the world, but as forming portion of a wider field, with which, to be intelligible, it must be continually compared. The Berlin Entomologists, so far as they have hitherto expressed themselves, have been opposed to the theory of the gradual, natural formation of species. We have not any published account of the opinions they have held, except some short notes of the late Dr. Schaum, in which, discussing the subject of the origination of well-marked local varieties of the genus Carabus, he announced his belief that the varieties had not been produced by migration and subsequent modification, but were created originally as local varieties. The same view, as is well known, is held by Professor Agassiz, who believes that a vast number of individuals of each species were simultaneously created over the whole area of its distribution; "creation," according to these authors, implying a miracle, or at least, a process lying beyond the field of human investigation. Von Kiesenwetter is the first of these learned Entomologists to announce his conversion to the opposite doctrine, namely, that local varieties have originated by modification of individuals which have migrated to the localities, that they have become further modified into species, and that the process by which this is effected is Natural Selection, as expounded by Darwin. He states that he has been gradually forced into the adoption of this view by the facts of variation presented to him, in the field and in the closet, whilst studying the European genus Oreina, an alpine group of Chrysomelidæ, abounding on the mountains of Central and Southern Europe. In the introductory paragraphs of his memoir, he states the Darwinian theory with great clearness and accuracy, showing how well he has studied its meaning,—unlike most other critics, naturalists as well as mere *littérateurs*,—and one is prepared to find in the sequel that, in understanding, he has accepted it. The objects which furnish the evidence that has had so much weight with him are certain species of Oreina, such as O. senecionis, speciosa, intricata and others. He appears first to have been struck with the fact, that whilst on some mountain ranges two or more of these species exist in great profusion, and show no signs, by the occurrence of intermediate forms, &c.,

of their being other than perfectly good and true species, in other alpine localities intermediate forms do occur, proving that the two or more species there blend together. He found cases also in which the formation of two or more distinct species was not quite complete, as proved by the occurrence of a very few individuals of the connecting varieties. Indeed authors had accepted these species as perfectly good ones, until further research revealed the existence of these rare varieties, when they were just as ready to treat the whole as varieties, as they were formerly to consider them as species. The fact of a species existing, structurally and functionally, as a species in one locality and as a mere variety in another, was not to be explained away by the argument, that the species were originally distinct, but had become blended by hybridization; for the effect of such hybridization after a few generations would have been to blend the whole of the allied species into one variable form; besides it would only shift the problem a step further, and we should have to inquire how the species originated in the first instance. There was no alternative for a naturalist demanding a rational explanation of such facts, but to accept the conclusion that species have no absolute permanent existence, but that changes intermittingly and slowly take place by their spreading over wider and wider areas, and adjusting themselves in structure and habits to the altered nature of the local conditions. Where there are numerous varieties in a locality, the process of variation and adaptation has not been completed; where well-defined species occur in more distant situations, the adjustment is, for the time, accomplished, and the connecting varieties between such species and their sister-forms, existing elsewhere, only betray the gradations of modification which have been passed through. I may be permitted here to remark that I have myself recorded a series of facts similar to those published by Herr von Kiesenwetter, with regard to the Heliconiidæ of South America, and have given a precisely similar explanation of them, so long ago as 1862, in the twenty-third volume of the Transactions of the Linnean Society, page 530.

The memoir of Herr von Kiesenwetter, as well as the series of facts brought out by myself on the Heliconiidæ, prove, I think, the importance of the study of Geographical Distribution, in connection with the supreme question of the Origin of Species. The facts of distribution, correctly and minutely noted, will probably supply more satisfactory data for the discussion of this question than any other class of facts in the domain of Natural History.

Mr. Darwin himself founds his theory, in the first place, on the results of domestication and cultivation; but the objection felt to the evidences of modification thus obtained—namely, that in domestication species are placed under artificial conditions and yield results dissimilar to those observed in free Nature—is not easy to overcome. In noting the modification of species in their natural state, as accompanying the differences of local conditions under which we find them, which is what I mean by the facts of distribution, we see the operation of changes independent of artificial interference; and once admitting that species do slowly and intermittently extend their areas of dissemination, and that certain local forms are modifications of their sister-forms, the whole process of the formation of species by natural means lies straightway open to our investigation, the steps of modification being capable of proof, by logical induction, after the premisses just mentioned are granted. Having attempted to follow this line of investigation in the case of several species and groups of species of insects, I have been surprised to find how defective are most of our collections in suites of specimens, and our books in recorded facts of this nature. Few Entomologists lay themselves out to collect series of specimens illustrative of this subject: I can assure them from experience that they would find it most interesting to do so. It is not sufficient to collect the varieties inhabiting a limited region, like the British Isles, but to follow each species over the entire area of its distribution, both in a vertical and horizontal direction, *i. e.* up mountain slopes, and over geographical areas, and obtain specimens from every place where varieties occur.

Another important memoir of similarly wide interest to the one just discussed has been recently read in England. I mean one on the mimetic butterflies of Southern Africa, by Mr. Roland Trimen, which will shortly be published in the Transactions of the Linnean Society. The process of adaptation of varieties of a species to different local conditions, and their great modification, is here expounded in the genus Papilio, especially in the remarkable case of Papilio Merope. The females of this species have a tendency to vary greatly from their males, and to put on a disguise which assimilates them to one or other species of Danais. It is a truly wonderful fact that at the Cape of Good Hope and in Western Tropical Africa, the females imitate species of Danais widely different in coloration, the males all remaining unchanged or nearly so, whilst in Madagascar the female

has undergone no change of dress, being coloured like the male. Mr. Trimen fully accepts the explanation I proposed six years ago, which has been also carried out by Mr. Wallace, for this class of phenomena, and it is naturally gratifying to us to find these observations and reasonings confirmed, in another part of the world, by so able an observer.

In conclusion, gentlemen, let me thank you for the courtesy and attention so unvaryingly shown to me during the year of my Presidency that has expired, and assure you that I shall ever do all in my power to increase the interest of our Meetings and promote the welfare of our now old-established Society.

A vote of thanks to the President for his services during the past year, with a request that the Address might be printed in the 'Proceedings,' was proposed by Mr. A. R. Wallace, seconded by Mr. Pascoe, and carried unanimously.

Thanks were also voted to the other Officers, and Members of the Council for 1868; and the votes were acknowledged by Mr. S. Stevens, Mr. Dunning and Mr. Janson.

Mr. M'Lachlan proposed, and Mr. W. C. Boyd seconded, a vote of thanks to the Pro-President for his conduct in the chair. This was also carried unanimously; and Mr. Frederick Smith made a suitable reply.

Abstract of the Treasurer's Accounts for 1868.

RECEIPTS.

	£	s.	d.
By Balance in hand, 1st January, 1868	1	10	4
„ Arrears of Subscriptions	18	11	0
„ Subscriptions for 1868	155	8	0
„ Admission Fees	21	0	0
„ Composition of Life Member	15	15	0
„ Sale of 'Transactions'	98	16	4
„ Interest on £109 14*s.* 9*d.* Consols	3	5	10
„ Tea Subscriptions	9	11	6
„ Donations, H. J. Fust, Esq.	25	0	0
„ „ Royal Society, per H. J. Fust, Esq.	25	0	0
„ „ Frederick Bates, Esq.	3	18	10
„ „ J. W. Dunning, Esq.	70	0	0
	£447	16	10

PAYMENTS.

	£	s.	d.
To Rent, Librarian, and Office Expenses	65	19	0
„ Printing 'Transactions'	184	2	0
„ „ 'Proceedings'	14	0	3
„ Plates, Engraving and Printing	61	16	6
„ „ Colouring	65	9	1
„ Books purchased	25	7	0
„ „ binding	11	18	0
„ Tea, 13 Meetings	13	13	0
Balance in Treasurer's hands	5	12	0
	£447	16	10

Liabilities and Assets of the Society.

LIABILITIES.

	£	s.	d.
To Loan of Mr. Dunning	45	0	0
	£45	0	0

ASSETS.

	£	s.	d.
By Arrears of Subscriptions:—			
Good (say)	18	18	0
Doubtful £42 0*s.* 0*d.*			
„ £109 14*s.* 9*d.* Consols (cost)	100	0	0
„ Cash Balance in hand	5	12	0
	124	10	0
Less Liabilities	45	0	0
	£79	10	0

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Note.—Where the name only of an Insect is mentioned, the description of the Insect will be found at the page referred to.

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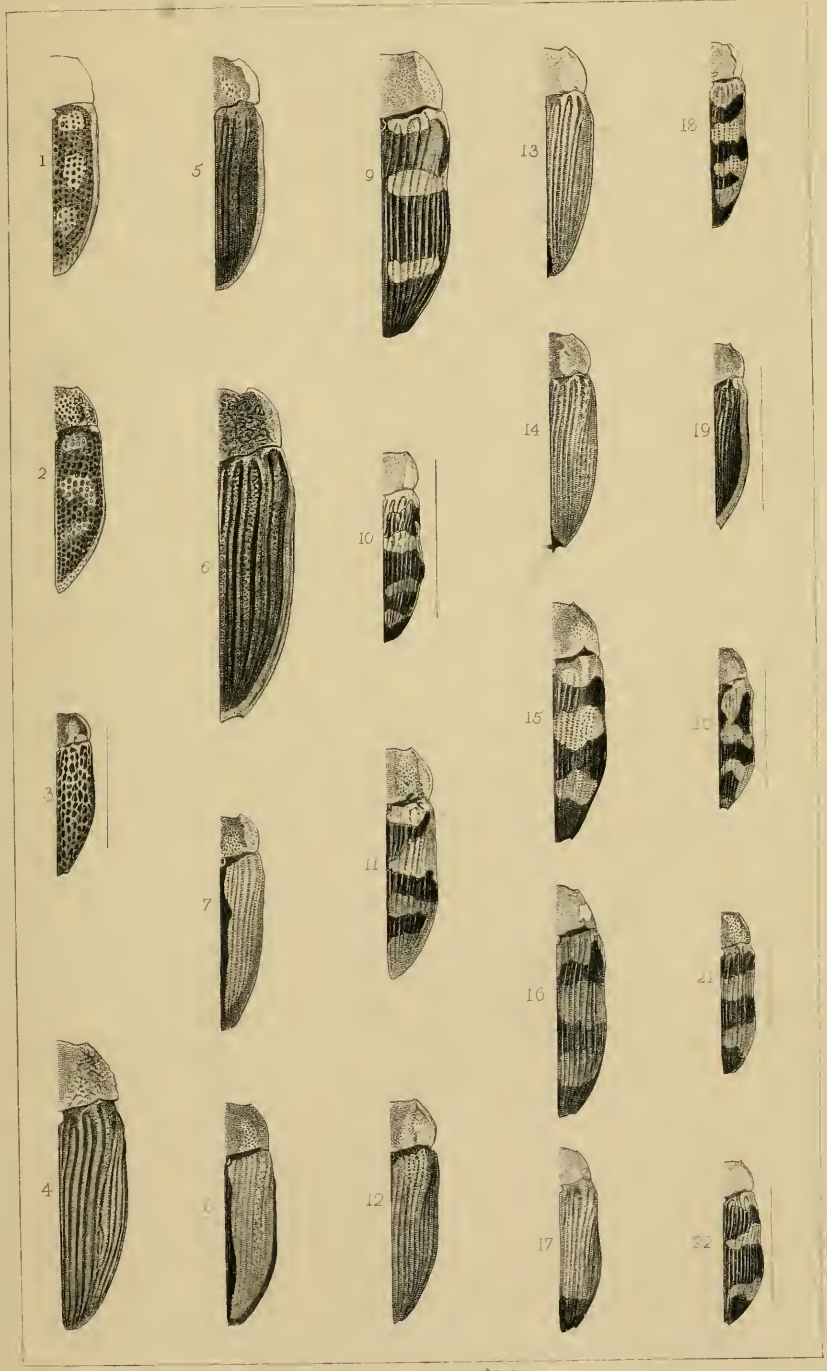

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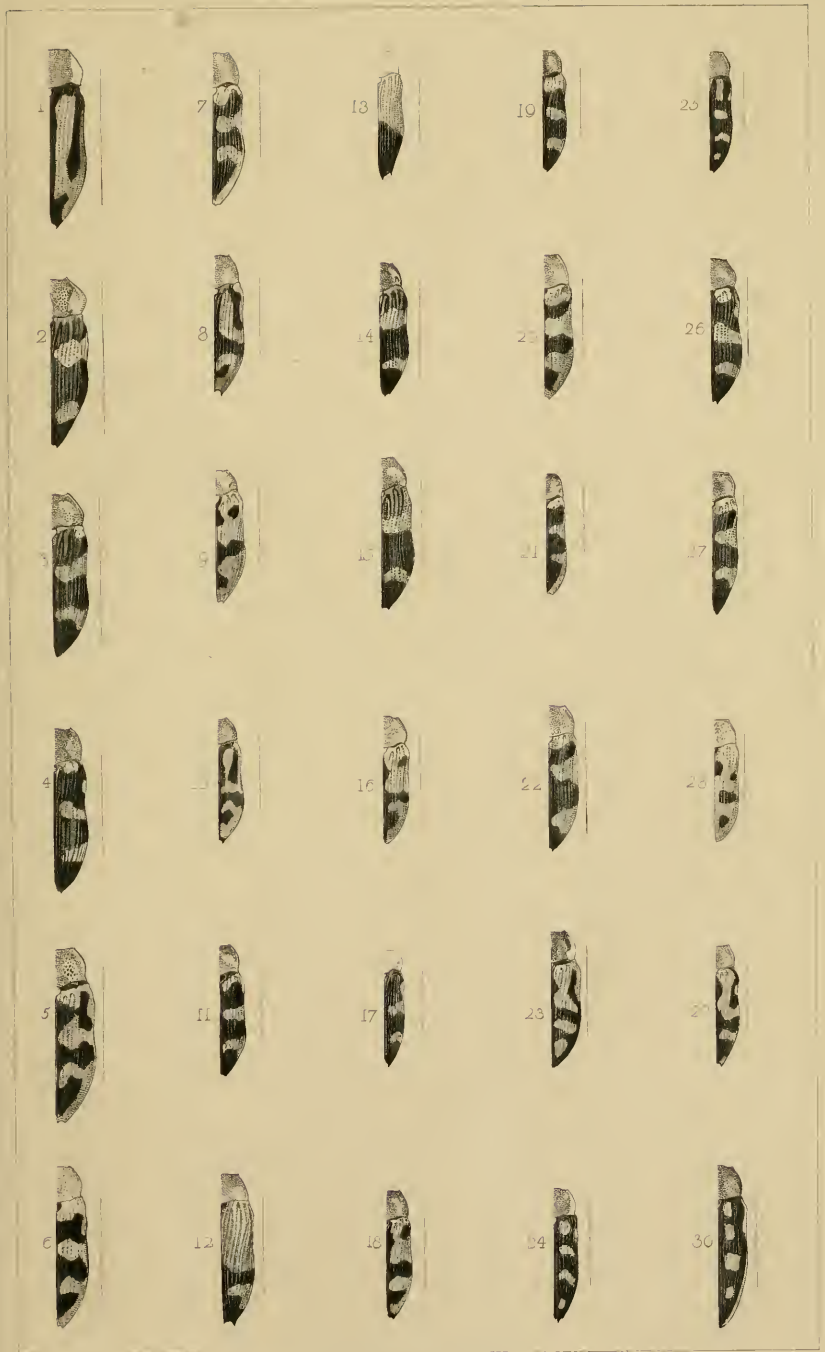

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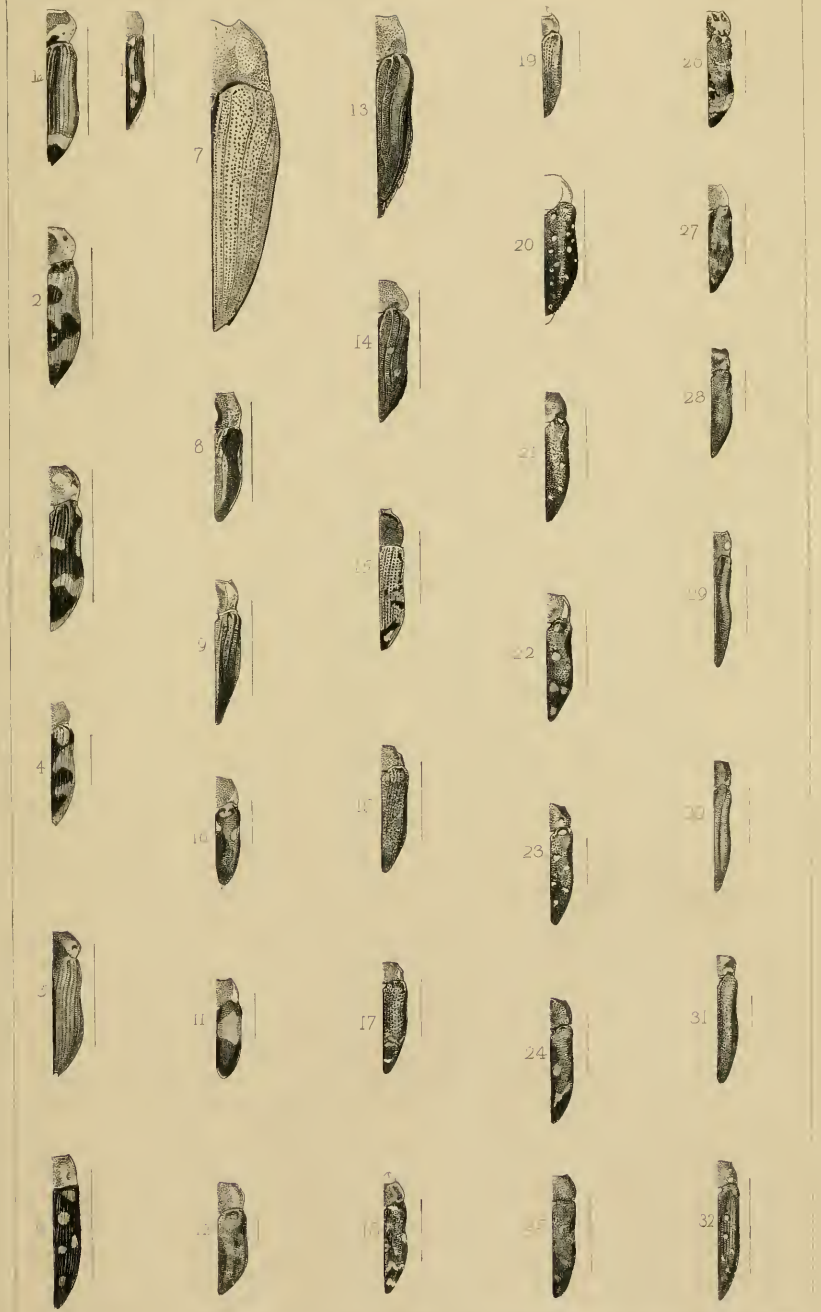
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3. *Panopea Tarquinia*. ,,
4. *Deloneura Immaculata*. ,,
5. *Zeritis Sardonyx* (underside) ,,
6. *Zeritis Chrysantas*. Trimen.
7. *Lycæna Barberæ* . ,,
8. *Cyclopides Syrinx* . ,,
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1. 2. *Papilio Echerioides* Trimen.
3, 4, 5 *Acræa Anacreon* ,,
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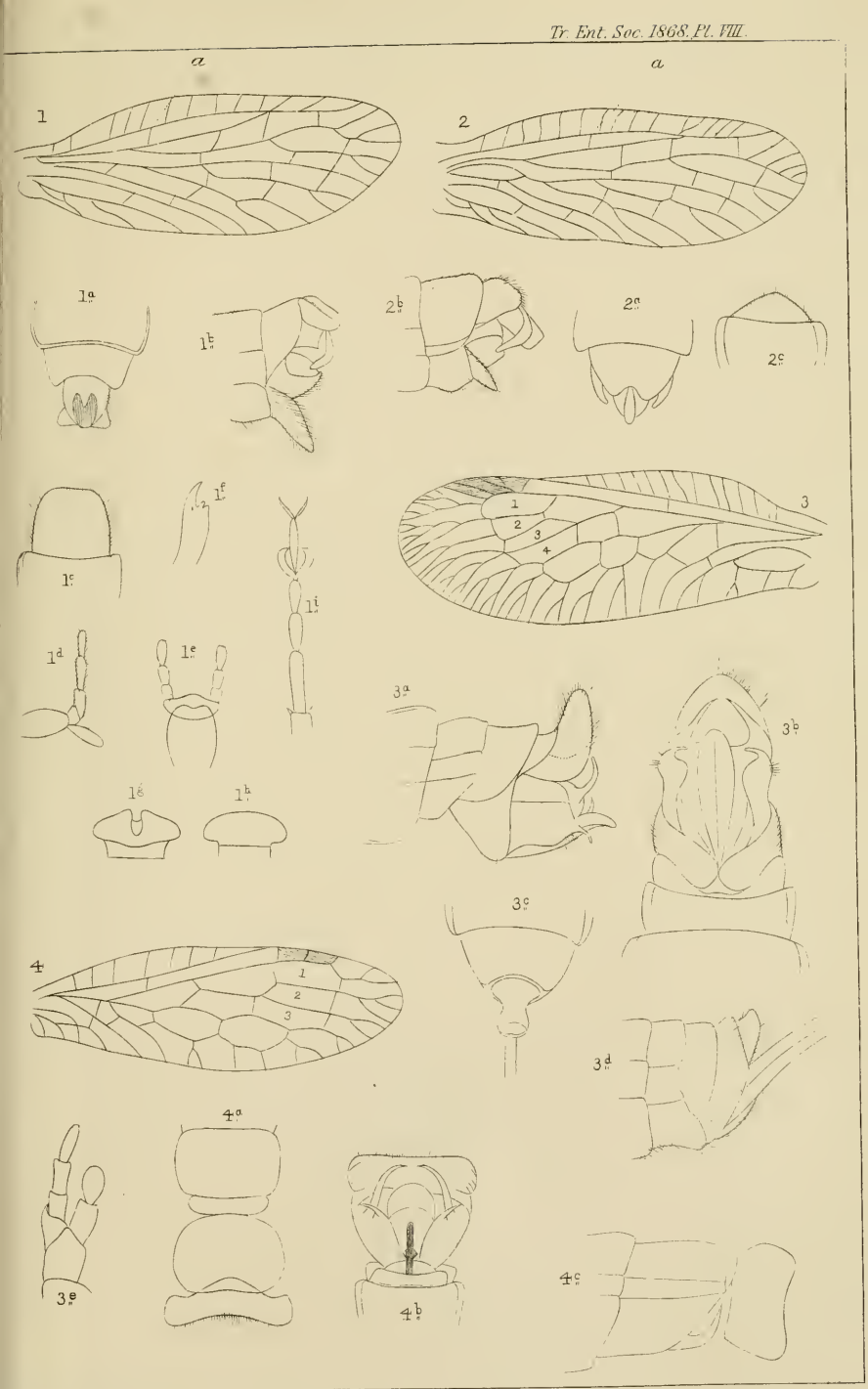

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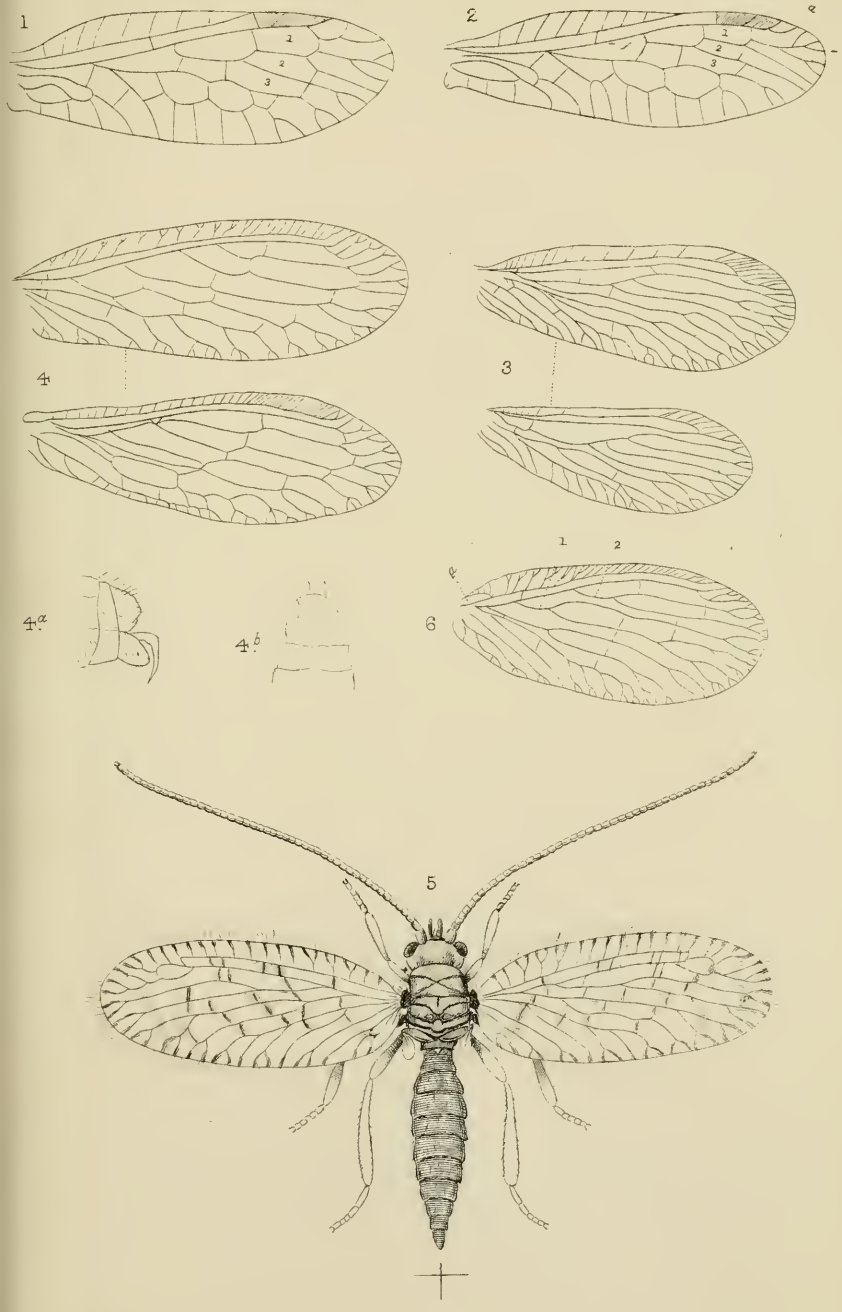

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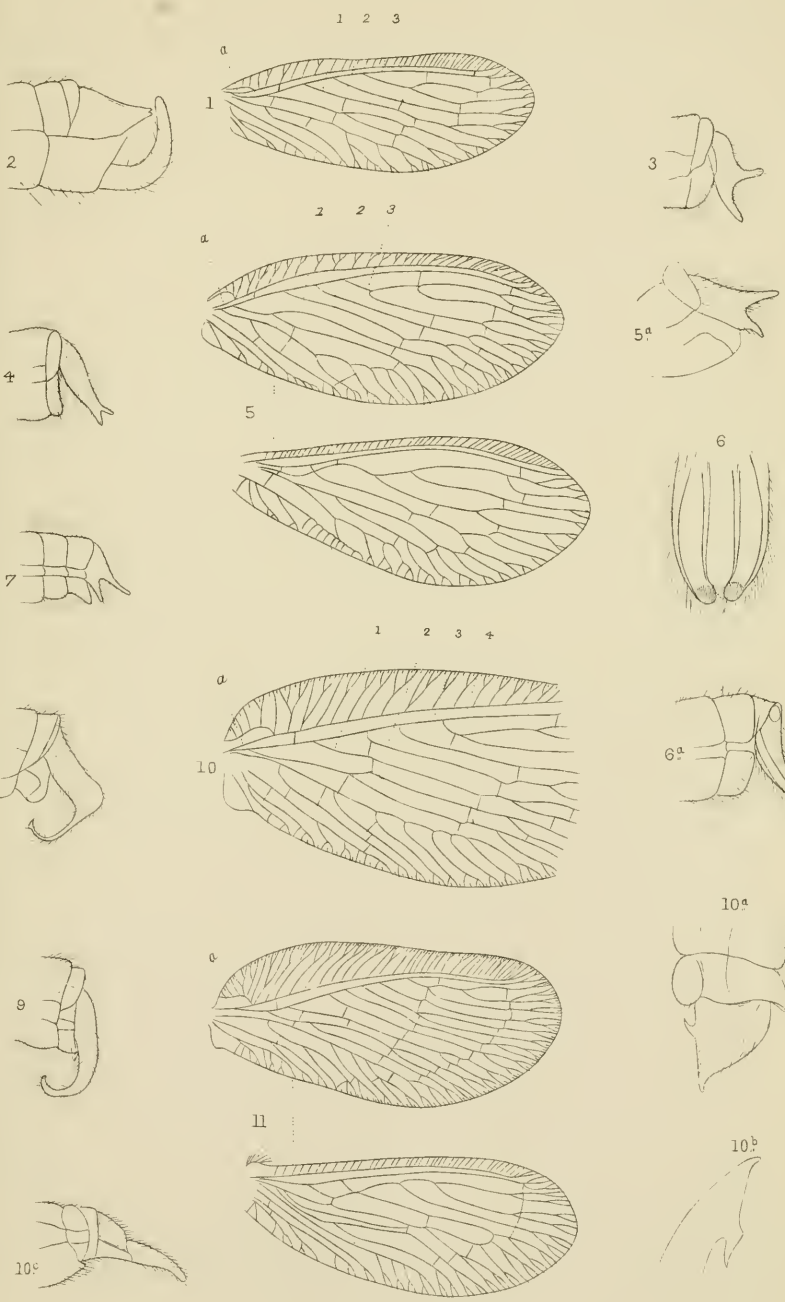

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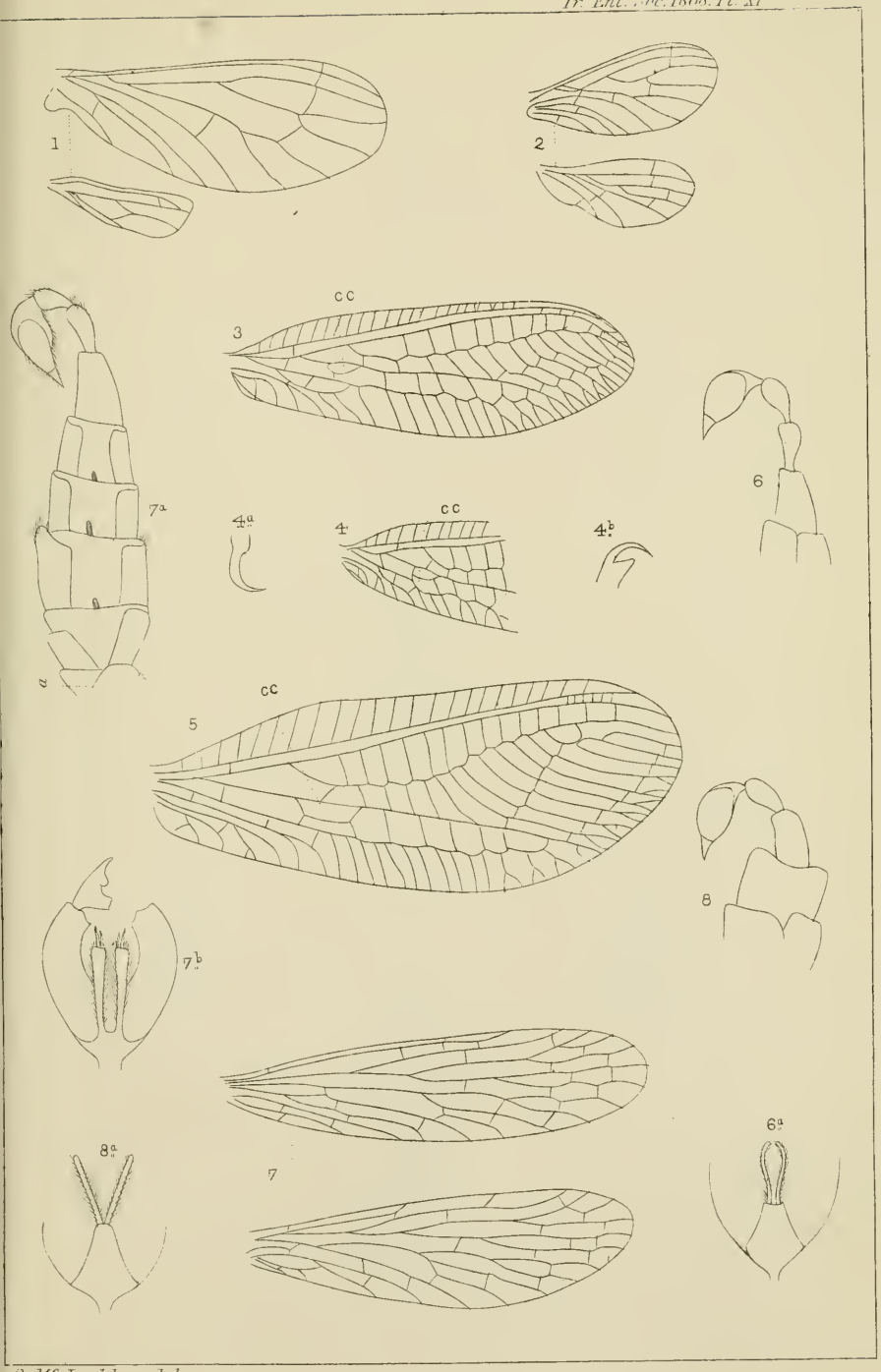

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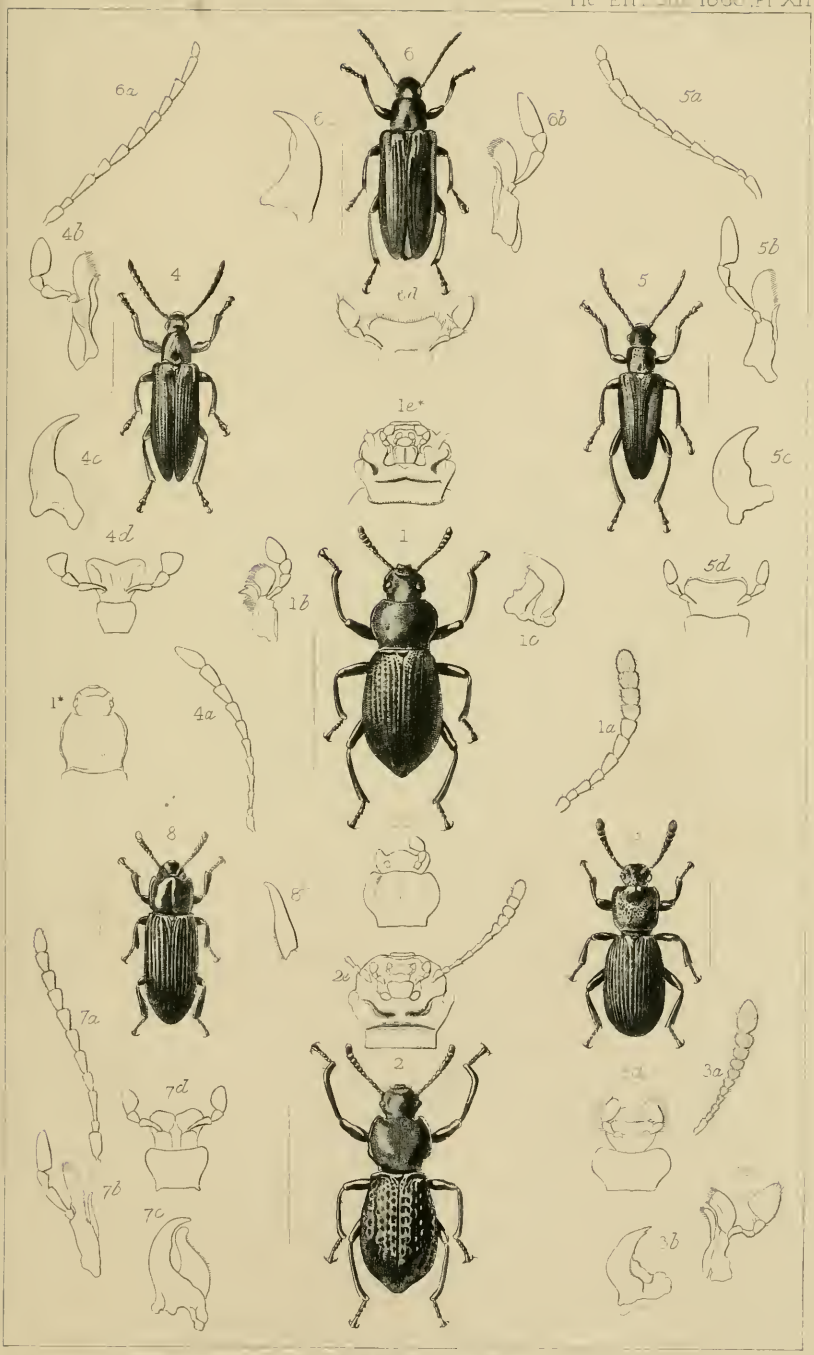

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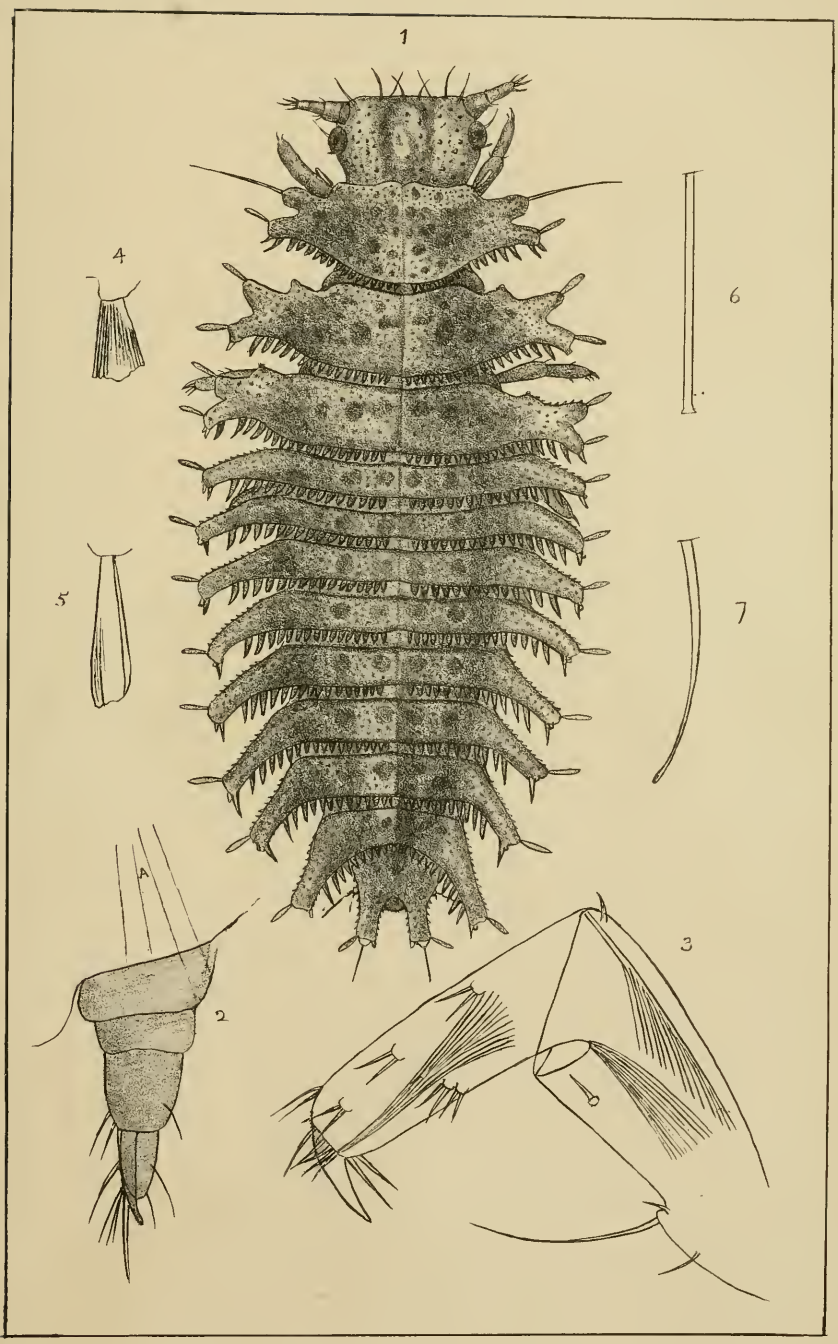
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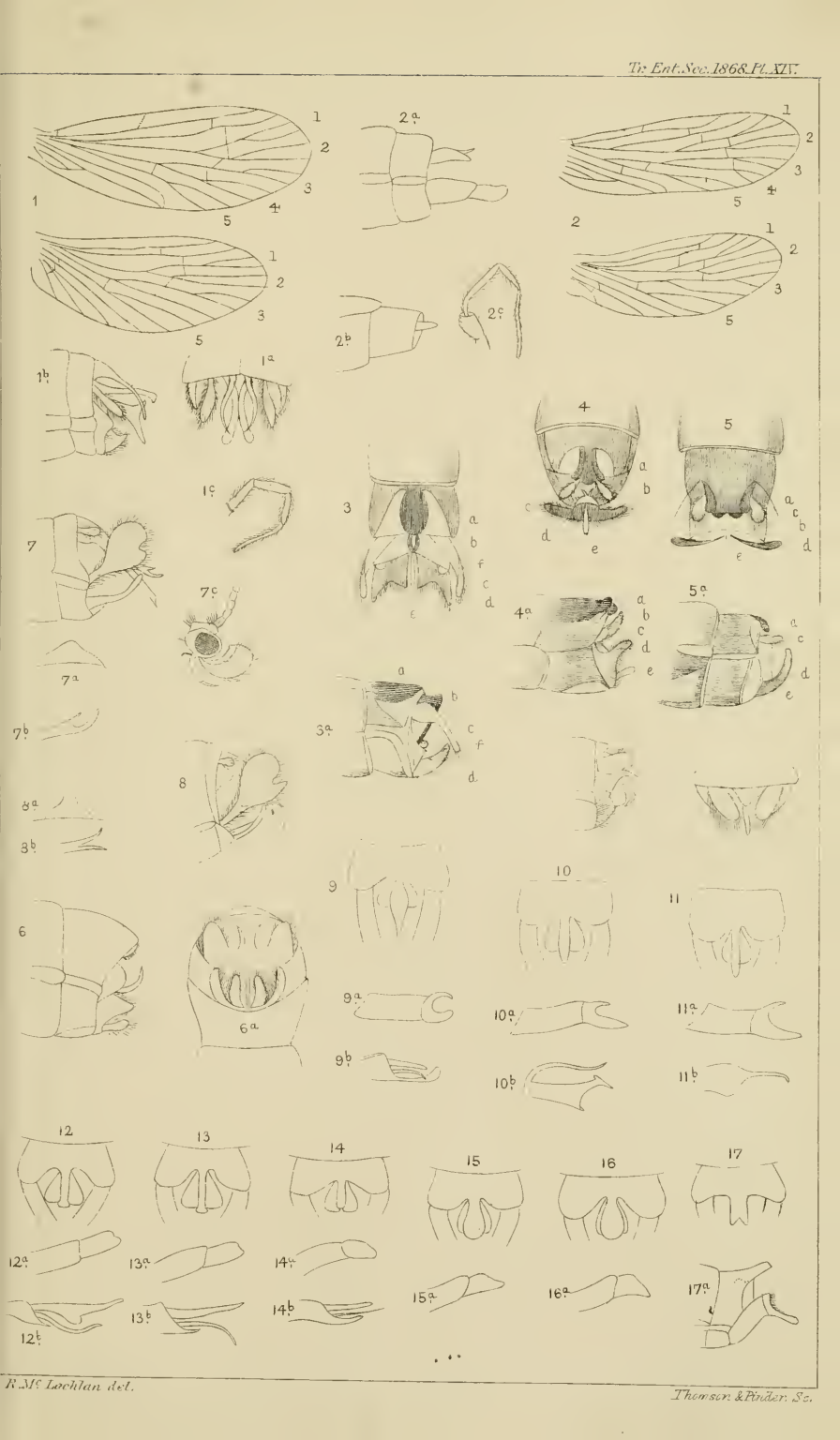

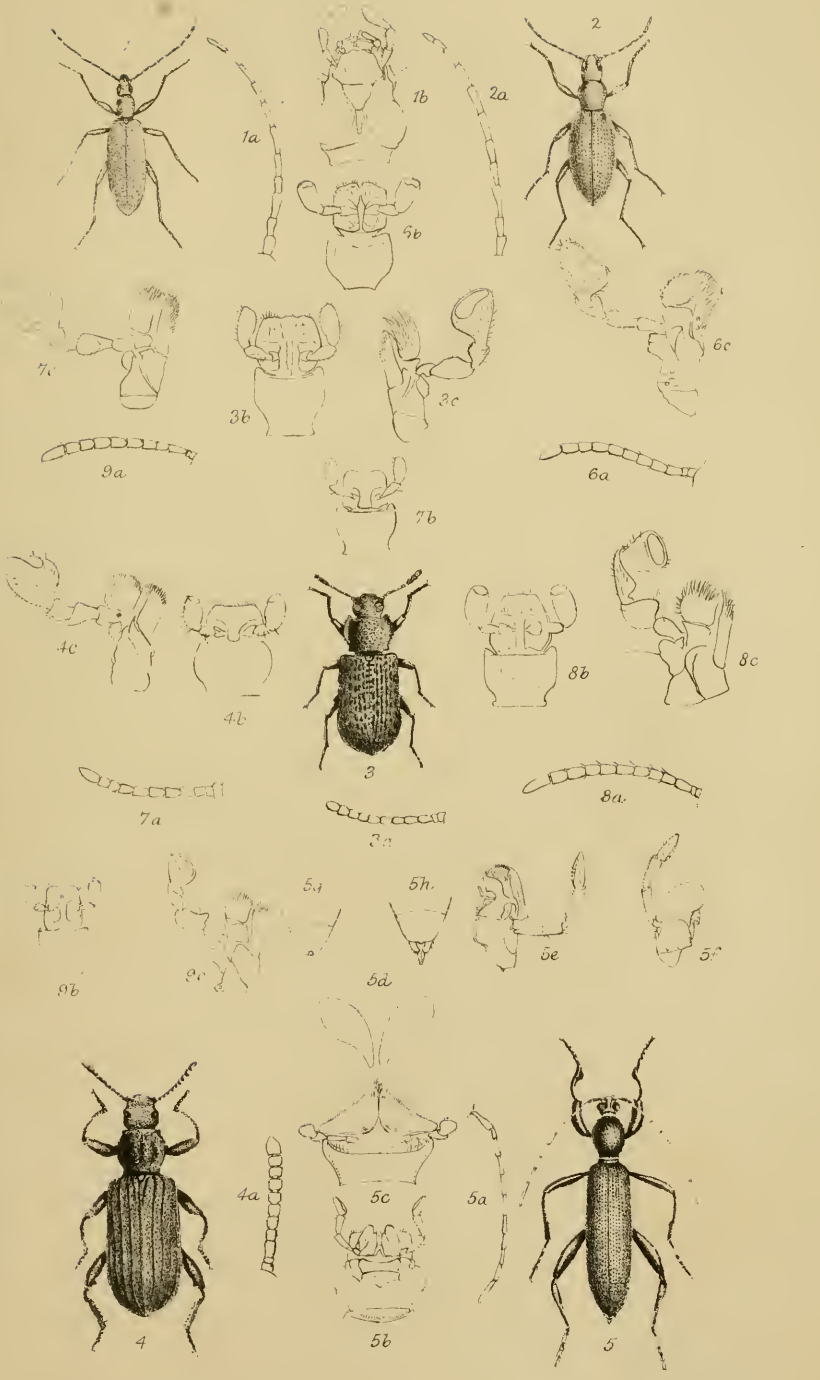
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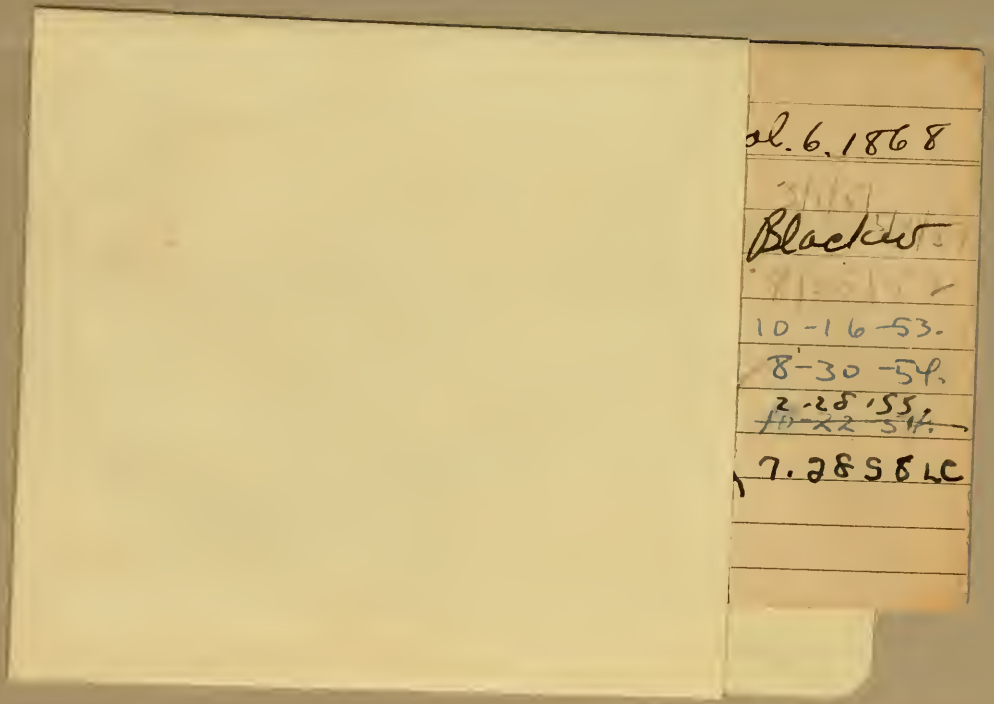
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